Annotated Bibliography
Florida Environmental Resource Valuation Case Studies
September 27, 1999

Adams, C. A, *"Economic Activities Associated with the Commercial Fishing Industry in Monroe County."* Staff Paper SP 92-27. 1990. 12-1-1992. Gainesville, FL: Food and Resource Economics Department, IFAS, University of Florida, Gainesville.

The commercial fishing industry represents an important source of revenue for Monroe County, Florida. This paper estimates (a) economic activity (b) earnings, and (c) employment generated by the commercial fishing industry in 1990. In 1990, commercial fishermen landed 19.7 million pounds of finfish, shellfish, and other aquatic organisms, valued at $48.4 million dockside. The total wholesale value of the various products landed by the commercial fishing industry in Monroe County was $64 million. The estimated economic impact generated includes economic activity - $90.4 million, earnings - $32.2 million, and employment - 2,230 FTEs.

Alvarez, J., Lynne, G., Spreen, T., and Solove, R. *"The Economic Importance of the EAA and Water Quality Management."* (Gainesville, FL: University Press of Florida. Everglades Agricultural Area (EAA): Water, Soil, Crop and Environmental Management (Edited by A.B. Bottcher and F.T. Izano), 1994).

Draining the Everglades and converting it to productive farmland was an act of capital formation. This chapter of the book, Water, Soil, Crop, and Environmental Management describes the resulting agricultural economic activity. Case studies are performed on the production factors of major crop sectors, such as sugarcane, vegetables, sod and rice. The EAA Mathematical Programming Model is used to evaluate the profit maximizing levels of production for producers when water quality standards are imposed.

Anderson, D.L. and E.G. Flaig, *"Agricultural Best Management Practices and Surface Water Improvement and Management."* Water Science and Technology, Vol. 31(8). Elsvier Science, New York, NY. August 1, 1995.

The Florida Surface Water Improvement and Management (SWIM) Act of 1987 and the Lake Okeechobee SWIM plan have established measures by which agricultural producers can reduce phosphorus (P) loads in stormwater draining into specific areas. The Everglades Forever Act of 1994 additionally emphasized the linkage of these landscapes and consequent protection and restoration of the Everglades. This paper summarizes the development of comprehensive water management in South Florida and the agricultural BMPs carried out to meet regulatory requirements for Lake Okeechobee and the Everglades.

Apogee Research, Inc., *"Lake Apopka Economic Analysis."* Final Report submitted to the St. Johns River Water Management District. Contract No. 96G307. Palatka, Florida, December 9,

1996.

Prior to implementing comprehensive restoration measures for Lake Apopka, this study analyzes the potential economic impact of purchasing and retiring 14,000 acres of muck farms to reduce phosphorus loading into the Lake. The comprehensive plan calls for other measures such as wetland filtration, control of "rogue" aquatic species, and hydrological planning. The analysis estimates the impact of the policy implementation on agricultural production and agricultural employment, property taxes, and lake-related recreational activities.

Apogee Research, Inc., in association with Resource Economics Consultants, Inc., "*Economic Assessment and Analysis of the Indian River Lagoon – Natural Resource Valuation of the Lagoon."* Submitted to the Finance and Implementation Task Force, Indian River Lagoon National Estuary Program, Melbourne, Florida, January 1996.

This study estimates the total economic value of the Indian River Lagoon (IRL) for the purpose of implementing the Comprehensive Conservation and Management Plan for the Indian River Lagoon National Estuary Program. Existing surveys on recreation and commercial activities were used as a basis for the research. A random sample telephone survey and a random sample intercept survey were conducted to supplement the information base. The total recreational value of the IRL was estimated at $627.4 million in 1995. The distribution of the annual economic value of the Lagoon across the five counties ranges from $193 million in Brevard County to $43.3 million in Indian River County.

Apogee Research, Inc., Planning and Management Consultants, Inc., Gary D. Lynne and Peter Thompson, *"Water Shortage Economic Impact Model – Task 3 Report."* Contract Number C90-1154. Submitted to the South Florida Water Management District, West Palm Beach, Florida, March 1991.

Arndorfer, D.J. and Bockstael, N., "*Estimating the Effects of King Mackerel bag Limits on Charter*
Boat Captain and Anglers", Environmental Resources Management North Central, Inc., Palatine, Illinois. Report Prepared for the National Marine Fisheries Service, Southeast Fisheries Center, Miami, Florida, 1986.

This study applied the standard travel cost technique with the value of time to a data set on anglers using charter boats out of Destin/Panama City in 1985. The authors focused on the catch of king mackerel. From the analyses, the authors suggest that a lower bound for the annual use value of a king mackerel angler using a charter boat is about $300. The upper bound may be as high as $1,100 according to the authors. Anglers using charter boats usually chartered boats, on average, about 1.7 times per year. Thus, the use value of the king mackerel recreational fishery in the northeast Gulf of Mexico ranges from a high of $647 per angler day to a low of $177 per angler day (expressed in 1985 dollars).

Ault, J.S., J.A. Bohnsack, and G.A. Meester, *"A Retrospective (1979-1996) Multi-species Assessment of Coral Reef Fish Stocks in the Florida Keys, USA."* Fishery Bulletin**,** Fishery Bulletin / U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. Washington, D.C. 1997.

Concern about habitat degradation and growing resource uses resulted in the establishment of the Florida Keys National Marine Sanctuary (FKNMS) in 1990. To support management decision making, this paper provides a baseline multi-species assessment of Florida Keys reef fish using a systems approach. The Keys reef fishery exhibits classic 'serial overfishing' in which the large, desirable species are the most vulnerable to fishing. The article discusses a six-point strategy to improve multi-species assessments and the prospects for sustainable reef fisheries management.

Bell F.W., *"Application of Wetland Valuation Theory to Commercial and Recreational Fisheries in Florida."* Florida Sea Grant Report No. 95. 1984. 6-1-1989. Gainesville, FL: Florida Sea Grant College Program, University of Florida. Also see Ecological Economics 21 (l997) 243-254 for the recreational segment and the Journal of Economic Research 3(l998) 1-20 for the commercial segment of this report in condensed form.

This paper is concerned with placing an economic value on the contribution of wetlands in supporting both the recreational and commercial marine fisheries in Florida. Production functions linking fishing effort and wetlands to fishery value are used to demonstrate the marginal productivity theory approach to valuing wetlands. Chapter 2 reviews the biological and economic functions of wetlands. Chapter 3 reviews methods for economic valuation of wetlands. Chapter 4 presents the marginal productivity theory approach to valuing wetlands. Chapter 5 examines marginal productivity theory applied to Florida's east and west coast marine fisheries; and Chapter 6 estimates the fishery component of wetlands and the calculated asset values of the wetland resources under alternative discount rates.

Bell, Frederick W., M.A. Bonn and V.R. Leeworthy, "*Economic Impact and Importance of Artificial Reefs in Northwest Florida"*, A contract report to the Florida Department of Environmental Protection (Office of Fisheries Management and Assistance), Contract Number MR235, Tallahassee, Florida, December, 1998.

This study evaluated the economic impact of artificial reefs in Northwest Florida covering Bay through Escambia counties plus the use value of artificial reefs. It was found that residents and visitors to the five-county area spent $414 million on goods and services that were related to the use of artificial reefs in the Gulf of Mexico. This spending generated 8,163 jobs with a payroll of nearly $84 million. This economic impact occurred over the 12-month period from 1997 to 1998. Three methods were used to estimate the use value of an artificial reef per angler per day for the five counties: (a) the Turnbull Distribution, (b) the dichotomous choice method, and (c) the travel cost method. The asset value for artificial reefs off Northwest Florida ranged from $656 million to $1.168 billion. Given that only about $5 million has been spent on artificial reef development since 1980, the artificial reef program has produced a large return on public expenditures.

Bell, Frederick W. *"Actual and Potential Tourist Reaction to Adverse Changes in Recreational Coastal Beaches and Fisheries in Florida."* Florida Sea Grant Report TP-64. 6-1-1992. Gainesville, Florida, Florida Sea Grant Program, University of Florida.

This study was designed to test the hypothesis that selected natural resource supply constraints in Florida's coastal zone will moderate the projected growth in Florida tourism. A survey was conducted to determine beach users willingness-to-pay for beach use. The application of the contingent valuation method to estimate use value revealed that tourist saltwater anglers were willing to pay $3.18 per day for their recreational experience.

Bell, Frederick W. and Leeworthy, V.R. *"Implementing User Changes for Public Goods: The Case of the Florida Keys National Marine Sanctuary."* Working Paper No. 95-03-02. 3-1-1995. Tallahassee, Florida, Florida State University, Department of Economics.

The authors conducted a case study of the Florida Keys National Marine Sanctuary (FKNMS) from which they examine the feasibility of placing a decal fee on pleasure boats as a form of user charge. The U.S. Congress as a new revenue source to pay for added spending suggested this user charge. Using a sample of boaters in Florida, the authors found that boaters' willingness-to-pay for a boat decal was positively related to income, boat length, household size and the use of the FKNMS and ranged, on average, from $9.62 to $16.56 per year. It was clear from protest bids that a boating decal fee would have strong political opposition.

Bell, Frederick W. and Leeworthy, V.R. *"The Potential Revenues from a Boating Decal Fee for the Florida Keys National Marine Sanctuary: A Preliminary Assessment."* 1992. 12-1-1993. Tallahassee, FL: Department of Economics, Florida State University, Silver Spring, MD: National Oceanic and Atmospheric Administration, Strategic Environmental Assessments Division.

This working paper investigates the potential revenue from a boating decal for the Florida Keys National Marine Sanctuary (FKNMS). The thrust of this paper is to investigate some recent factual data obtained from a statewide boating survey in the State of Florida as it relates to a boating decal fee in the FKNMS. Estimates of boat use in the FKNMS and boater's willingness-to-pay for a boating decal were used to estimate potential revenue collections. These estimates were then combined with a boating demand model to forecast potential future revenues. Limitations of the analysis are discussed, and recommendations for future research presented.

Bell, Frederick W. and Leeworthy, V.R., "*An Economic Analysis of the Importance of Saltwater Beaches in Florida."* 2-1-1986. Florida Sea Grant Report 82, pp. 1-166. Gainesville, Florida, Florida Sea Grant Program, University of Florida.

To evaluate the economic impact and recreational value of saltwater beaches in Florida, two surveys were conducted over the l983-84 period. The first surveyed out-of-state tourists as they left the state. Tourists are an important aspect of Florida's economy and thus the role of beaches. The second survey was a telephone survey of Florida residents. The estimated economic impact of

tourists while at Florida's saltwater beaches was over $3.4 billion in sales, supporting 142,638 jobs with an annual payroll of $860 million, considering direct and indirect effects. Florida residents spent over $1.1 billion while at the beach, supporting 36,619 jobs with an annual payroll of $240 million. Using the contingent value method (CVM), it was determined that residents were willing to pay $1.31 per day for a visit to the beach.

Bell, Frederick W. and Leeworthy, V.R., *"Estimation of the Demand and Supply of Marina Services in the State of Florida - 1969-1983."* Tallahassee, FL: Florida Department of Natural Resources, Division of State Lands. December 1984.

The study answers the following questions. What is the present demand for marina facilities in Florida? How is this demand likely to increase in the future? What is the existing supply of marina facilities? And is it likely that demand for marinas will place great pressure on limited wetland resources? A demand model was used to predict the probability that a registered boat will be berthed at a marina (use marina services). The estimated demands for marina wet slips and dry racks were then projected into the future using the boat registration forecasts and forecasts of the probabilities that registered boats will be berthed in marinas.

Bell, Frederick W. and McLean, M., *"The Impact of Manatee Speed Zones on Property Values: A Case Study of Fort Lauderdale, Florida."* 6-1-1996. Florida State University, Department of Economics: Tallahassee, Florida; Save the Manatee Club: Maitland, Florida.

The study addresses the relationship between manatee speed zones and the market value of property in Fort Lauderdale, Florida. The study used a hedonic property value model that relates the selling price of a piece of property to the property's characteristics including the property's location relative to manatee speed zones. The study found that, contrary to popular belief, manatee speed zones increased property values in Fort Lauderdale, Florida while holding other property characteristics constant. The hedonic property value model found that manatee speed zones increase property values from 15 to 20 percent.

Bell, Frederick W. and Sorensen, P.E., *"A Socioeconomic Impact Assessment of Selected Management Strategies: Florida Keys National Marine Sanctuary."* 5-1-1993. Tallahassee, FL: Department of Economics, Florida State University, Silver Spring, MD: National Oceanic and Atmospheric Administration.

This study provides a socioeconomic impact assessment of 24 selected management strategies for the Florida Keys National Marine Sanctuary. The strategies included in the assessment were chosen based on their relative importance and because they were representative of the types of impacts across groups and industries. Strategies addressed included Boating, Fishing, Land Use, Recreation, Water Quality, and Education.

Bell, Frederick W. and Vernon R. Leeworthy, *"Recreational Demand by Tourists for Saltwater Beach Days", Journal of Environmental Economics and Management, 18, 1990, 189-205.*

This analysis addresses tourists (out of state) who come from significant distances for the primary purpose of enjoying the beach resources of Florida. It is argued that those that use the conventional travel cost method do not recognize its potential spatial limitations. The study concludes that the annual consumer demand by individual tourists for Florida beach days is positively related to travel cost per trip and inversely related to on-site cost per day. Using the on-site cost, the consumer surplus per person per day (i.e., use value) for saltwater beach use was estimated at $34 (in 1984 dollars) without the opportunity cost of time. Using a 10 percent discount rate and an estimated 70 million beach days for the tourist segment of the market for beaches, it was estimated that the asset value (i.e., capitalized value) of Florida's saltwater beaches is $23.74 billion. This does not include the resident part of the asset value.

Bell, Frederick W., *"An Analysis of the Economic Base of Monroe County, Florida with Implications for Oil and Gas Explorations."* 1989. 5-1-1991. Tallahassee, FL: Department of Economics, Florida State University.

The study identifies the economic base of Monroe County over the 1969-1988 period. Kearney/Centaur (1990) produced it as a companion to the study titled Impacts of Oil and Gas Development on Recreation and Tourism Off the Florida Straits. Location quotients, along with professional judgments, were used to separate the Monroe County economy into local and export sectors. Estimates of personal and export income were used to derive an income multiplier for the county. Using information from a 1989 survey of Florida Keys visitors regarding responses to a hypothetical oil spill, the impacts of an oil spill were assessed with respect to the impacts on Monroe County's personal income for year 1987.

Bell, Frederick W., *"Current and Projected Tourist Demand for Saltwater Recreational Fisheries in Florida."* Florida Sea Grant Report No. 111. 1992. 5-1-1993. Gainesville, FL: Florida Sea Grant College Program, University of Florida.

The central purpose of this report is to estimate the current and projected demand for saltwater recreational fisheries by tourists visiting Florida. This report is both an update of the Bell, Sorensen and Leeworthy (1982) study conducted in 1981 and an extension of this work to a forecast of the demand pressures likely to occur on Florida's coastal fisheries. The study data was obtained using a face-to-face survey of 3,900 tourists visiting Florida between August 1991 and February 1992 stratified by auto and air access into Florida.

The study found that about 16.5% of the tourist population engaged in saltwater recreational fishing sometime during the year. The study also found that, in 1991, with about 3 million tourists participating in saltwater recreational fishing, total direct spending of $1.306 billion was generated. The total direct spending supported 23,518 retail and service jobs and wages of approximately $235 million. This spending was estimated to have generated about $62 million in revenue to the State of Florida in the form of sales, gasoline, and corporate income taxes. Tourist saltwater anglers are expected to double to about 6 million by the year 2010. Expenditures are also expected to double by 2010, generating over $2.6 billion (1991 prices)

Bell, Frederick W., *"Economic Impact of Bluebelting Incentives on the Marina Industry in Florida."* Florida Sea Grant Report No. 99. 6-1-1989. Gainesville, Florida, Florida Sea Grant College Program, University of Florida.

This report assesses the economic impact of five alternative methods of providing incentives to marina owners to address the issue of public access to public water bodies throughout the State of Florida. The report focuses on the economic benefits, cost and limitations of all forms of bluebelting for marinas in the State of Florida. Bluebelting is derived from the practice of granting tax relief to farmers to preserve agricultural land called greenbelting. The report assesses the lessons learned from greenbelting as they might be applied to marinas in Florida to preserve access to Florida's public water bodies.

Bell, Frederick W., *"Economic Policy Issues Associated with Beach Renourishment",* Policy Studies Review, November, 1986, Vol. 6, No. 2. 374-381.

The study sought to understand how use value of beaches varies with crowding. In 1984-85, a sample of 744 Florida residents was interviewed by phone regarding their saltwater beach use in Florida. Respondents were asked a contingent value (CV) question regarding their willingness-to-pay for beach use. The money collected would be used for preservation of the beach. The willingness-to- pay, or use value, was found to rise with space available per person and then declined as crowding occurs. For Pompano Beach, Florida, this beach standard would lead to a use value of $1.71 per beach user per day (in l984-85 dollars). There is some evidence that out-of –state tourists are willing to pay more (i.e., have a higher use value) for beaches than residents. If so, the benefit/cost analyses may be conservative.

Bell, Frederick W., *"Estimating the Projected Demand and Needed Supply of Boat Ramps: A Case Study of South Florida."* Working Paper No. 95-02-04. 2-10-1995. Tallahassee, FL, Florida State University, Department of Economics.

This article develops a theoretical framework for boat ramp demand and supply and formulates a model estimating the demand for boat ramp services using an untraditional demand approach. The entire State of Florida is used as a case in point. The model proved that although boat registrations will increase, the probability of buying a boat will fall due to rising affluence, age and boat size in Florida. The projection of boat registrations together with the conditional probability of using a boat ramp resulted in a forecasted expansion in demand for boat ramp services in Florida by 25 and 35 percent using logit and OLS respectively over the 1992-2005 period. This expansion in demand will create a need for an additional 2,108 or 2,534 boat lanes (I.e., logit versus OLS) by the year 2005 in Florida using the 30-foot boat scenario.

Bell, Frederick W., *"Estimation of the Present and Projected Demand and Supply of Boat Ramps for Florida's Coastal Regions and Counties." Florida Sea Grant Technical Paper (TP-77), April 1995.*

Registered boats less than 26 feet in Florida have expanded from 449,995 in 1982 to 620,548 in

1993. Boats of this size are likely to be hauled to boat ramps for access to water bodies around the state. Of the present boat ramps in Florida, 53% are provided by the public sector. A projection model was used to estimate the number of boats registered in each of Florida's 28 coastal counties to the year 2005. The projected registered boats were further broken down into those having a high probability of using boat ramps. With the existing supply as of 1992 of boat ramps, it was projected that 10 of the 15 coastal regions will need additional boat ramps over the 1992 base year. The number of ramps required would range from 9 lanes in Region 1 (Escambia and Santa Rosa) to 98 lanes in Region 15 (Duval and Nassau). By the year 2010, only 3 of the 15 regions will not need additional boat lanes.

Bell, Frederick W., *"The Economic Impact and Valuation of the Recreational and Commercial Fishing Industries of Lake Okeechobee,"* Florida. 10-1-1987. Tallahassee, Florida, Final Report submitted to the Florida Game and Freshwater Fish Commission and Florida Department of Environmental Protection.

This report provides estimates of the baseline economic impact and value of both the commercial and recreational fisheries of Lake Okeechobee, Florida. The economic base approach was used to estimate the economic impact. For fiscal year 1985-86, the study estimated a combined economic impact of over $28 million in sales/output, almost 1,000 jobs, and about $1.2 million in tax revenues from the commercial and recreational fisheries of Lake Okeechobee. The study also estimated the annual user value of the recreational fishery to be about $8.3 million. Using a conservative assumption that the annual value remains constant in the future, and employing a real discount rate of 8.625 percent, the asset value of the resource was estimated to be about $100 million.

Bell, Frederick W., *"The Economic Valuation of Saltwater Marsh Supporting Marine Recreational Fishing in the Southeastern United States."* Working Paper No. 95-02-02. 2-1-1995. Tallahassee, Florida, Florida State University, Department of Economics. Also, see same title in Ecological Economics 21 (l997) 243-254.

In this study, six proposed methods of wetland valuation are considered and found to be deficient. Following Lynne et al. (1981), a production function approach to valuing the importance of saltwater marshland to marine recreational fisheries has been advocated. To simplify the analysis, the rather complicated production function, which was linked to a demand function for recreational fisheries, was approximated with a Cobb-Douglas form. For 1984, capitalized values of an acre of saltwater to the recreational finfish fishery alone were $6,471 and $981 for the east and west coast of Florida, respectively.

Bell, Frederick W., Abtonini, G., Kamper, E., Swett, R., and Tupper, H., *"Planning for Public Boating Access: A Geographic Information System Approach to Evaluate Site Suitability for Future Marinas, Ramps and Docks in Charlotte County, Florida."* Florida Sea Grant Report TP-87. 5-1-1997. Gainesville, Florida, Florida Sea Grant Program, University of Florida.

Charlotte County, Florida faces a major planning dilemma: how to balance population growth and coastal development with conservation and management of its estuarine resources. This study seeks

to provide answers to this question. The Charlotte County boater population was projected to increase from 13,876 pleasure craft in l992 to 43,103 in 2010. The study results provide Charlotte County with a planning instrument that specified the type, quantity and location of public shore access and boating facilities (marinas, ramps, docks) needed to meet anticipated demand, such as boating, through the year 2010.

Bell, Frederick W., McGinnis, H. Story, C., Sloope, and P. Rose, "*The Economic Value of Lake Tarpon, Florida and the Impact of Aquatic Weeds"*, A.L. Burruss Institute of Public Service, Kennesaw State University, Kinnesaw, Georgia, Prepared under a contract with the Florida Department of Environmental Protection (Division of Aquatic Weeds), February, l998.

Lake Tarpon is located in Pinellas County, Florida (Tampa Bay Area). This study estimated the economic impact of Lake Tarpon on the surrounding areas and estimated the user value of the lake. Results from a phone survey proved that 9.5 percent of the local population use the lake. It was estimated that including multiplier impacts on activities on the coast of Lake Tarpon, the economic impact area generated $50.4 million that are lake-related. This in turn generated $9 million in wages and 711 jobs. Applying the zonal travel cost method to the users of Lake Tarpon, it was found that the use value per day was $3.20 including the opportunity cost of time. The study concluded that participation in the recreational activities would increase if level of existing aquatic weeds were reduced.

Bell, Frederick W., McGinnis, H., Story, C and P. Rose, *"The Economic Value of Lake Jackson"*. A. L. Burruss Institute of Public Service, Kennesaw State College, Marietta, Georgia. Prepared under EPA grant, No. X821524-01-1, 1995.

The purpose of this study was to estimate the economic impact on Lake Jackson, Florida on the economy of Leon County, Florida. In addition, the zonal travel cost method was employed with the value of time to estimate the use value of a recreational day at this freshwater lake. When the Leon County multiplier was applied, it was estimated that Lake Jackson accounted for $10.3 million in spending in l993, supporting almost 100 jobs. The estimated daily use value of the lake was $3.68 for all kinds of recreation (expressed in l993 dollars).

Bell, Frederick W., P.E. Sorensen and V.R. Leeworthy, "*Economic Impact and Valuation of Saltwater Recreational Fisheries in Florida."* SGR (Sea Grant) Report Number 47, August, 1982. Tallahassee, Florida.

This study explored the economic impact and recreational valuation of all saltwater recreational fisheries in Florida. With respect to the economic impact, it was found there were 2.1 million resident marine anglers and 3 million tourist marine anglers in 1980. These two groups spent over 58 million angler days on fishing, generating over $5 billion in direct and indirect spending in the State of Florida. These expenditures supported over 44,000 jobs. In 1980-81, anglers were asked how much they would be willing to pay to preserve the fisheries in Florida and continue fishing in the state. This contingent valuation question established some of the first use value estimates for recreational saltwater fishing in Florida. It was estimated that the total annual use value was over

$2 billion. Using a discount rate of 7.625%, Florida's capitalized (asset) value for marine recreational fisheries was an estimated $27.4 billion in l980-81.

Bendle, B.J. and Bell, Frederick W., *"An Estimation of the Total Willingness to Pay by Floridians to Protect the Endangered West Indian Manatee through Donations."* Tallahassee, Florida, Florida Department of Environmental Protection, Economic Analysis Section and Florida State University, Department of Economics. November 1, 1995.

This study uses a variation of one of the existing techniques known as Contingent Valuation by surveying a random sample of 951 Floridians in the winter of 1992/93. The survey elicited information about current donations to several of causes, including the plight of the manatee. A contribution continuum method was used for the analysis. This method was reinforced by other empirical techniques. The analysis estimated Floridians' total asset value on protection of the manatee population to be $2.6 billion, or $14.78 per year, per household. Given that there were an estimated 1,800 to 2,000 manatees left in existence, this might be interpreted as meaning that protection of each manatee is conservatively worth $1.5 million to Floridians.

Bhat, Mahadev G, "*Valuation of Recreation Benefits of Marine Reserves in the Florida Keys: A Combined Revealed and Stated Preference Approach*." Environmental Studies Department, Florida International University. University Park, Miami, Florida. 1999

The quality of the coral reefs in the Florida Keys is essential to sustain tourist's interest in the Keys. The recently established marine reserves (MR), are expected to improve the quality and quantity of various attributes of the reefs, including coral and fish abundance and diversity. This study demonstrates how one could measure the recreation benefits of MR-induced quality improvement of the coral reefs. A sample survey was used to obtain data on visitors' travel costs and number of trips under existing reef condition, and their stated preference for trips in response to the MR-related reef improvement. A recreation demand model is derived using the survey data.

Boggess, W.G. *"A Case Study of Nutrient Management for Florida Dairies."* Economic Issues Associated with Nutrient Management (Edited by P.E. Norris and L.E. Danielson) Southern Regional Information Exchange. Group-10, Southern Rural Development Center, Mississippi State University, Mississippi, pp. 109-127 (1994).

This study analyzes different regulatory and incentive-based policies for controlling non-point source pollution from dairy farms in areas north of Lake Okeechobee. Technical and economic barriers for implementing various policy alternatives are identified.

Boggess, W.G., Flaig, E.G., and Fonyo, C.M. *"Florida's Experience with Managing Non-point Source Phosphorous Runoff into Lake Okeechobee."* Paper prepared for presentation at the 1991 AERE Workshop, "The Management of Non-point Source Pollution", Lexington Kentucky. 6-1-1991. Food and Resource Economics, University of Florida, Gainesville, Florida and South Florida Water Management District: West Palm Beach, Florida.

This report first describes then examines what has been learned from Florida's 15 years of experience with trying to control phosphorous runoff from agricultural lands into Lake Okeechobee. The report provides a brief description of the natural system, an overview and chronology of phosphorous management/control programs, outlines and describes the evolution of monitoring programs and analysis, outlines the evolution of phosphorous control technologies and incentives for adoption, examines the costs and impacts of various programs, and derives lessons and implications for other similar problems.

Boggess, W.G., Johns, G., and Meline, C. *"Economic Impacts of Water Quality Programs in the Lake Okeechobee Watershed of Florida."* Journal of Dairy Science Vol. 80(10) (1997): 2682-2691. (see also Hazen and Sawyer full report)

In an effort to reduce phosphorus loads into Lake Okeechobee from dairies and other agricultural lands, in the 1980s state agencies, including the South Florida Water Management District (SFWMD), implemented three programs. These programs were (1) the Dairy Rule, (2) the Dairy Buyout Program, and (3) the Okeechobee Works of the District (WOD) Rule. Direct economic impacts from all three programs included the following: (a) mean annual reductions in milk sales of $28 million and in employment, 274 jobs; (b) total economic impact (i.e., direct, indirect, and induced) included a $38.2 million decrease in sales, (c) an $18 million (4 percent) decline in incomes, and a loss of 492 jobs. Relocation incentives and milk production increases helped maintain retail milk prices.

Bohnsack, J.A., Harper, D.E., and McClellan, D.B. *"Fisheries Trends from Monroe County, Florida."* Bulletin of Marine Science. Vol. 54 (3) (1994): 982-1017.

Fishing is an important activity in the Florida Keys National Marine Sanctuary(FKNMS). Concern exists that excessive fishing could be deleterious to individual species, disrupt marine ecosystems, and damage the overall economy of the Florida Keys. Data from commercial, recreational, and marine life fisheries in Monroe County, Florida were examined. In 1992, the total reported commercial landings were composed of 52% invertebrates(4,090,000 kg), 28% reef fishes (2,190,000 kg) and 21% non-reef fishes (1,620,000 kg). In the recreational headboat fishery, reef fishes account for 92% of 107,000-kg average total annual landings from the Dry Tortugas and 86% of 201,000 kg landed from the Florida Keys since 1981. Average annual landings for other recreational fisheries were estimated at 1,790,000 kg for reef fishes (45%) and 2,170,000 kg for non-reef fishes (55%) from 1980 through 1992.

Burton, S., Vickery, C., and Weiss, K., *"Public Education Survey for the Indian River Lagoon, National Estuary Program."* 9-1-1994. FAU/FIU Joint Center for Environmental and Urban Problems. US EPA (National Estuary Program), St. John's River Water Management District.

The Indian River Lagoon(IRL) spans some 156 miles along Florida's central east coast. It is listed as an estuary of national significance and included in the National Estuary Program. Results from the survey provided a basis for determining a desirable and acceptable approach to educating the public about the environmental issues of concern and their potential solutions as they relate to the

IRL. Furthermore, the survey may also be used to better understand how to target various audiences within the general population for public information and education. Survey information was obtained through telephone interviews with 407 randomly selected residents from the five counties that form the IRL system, Brevard, Indian River, Martin, St. Lucie, and Volusia.

Centaur Associates, Inc., *"Socioeconomic Assessment of Fishery Management in Everglades National Park: Final Report."* Washington D.C., Everglades National Park, National Park Service, U.S. Department of the Interior**.** September 1, 1986.

This report focussed on the Everglades and Florida Bay, providing the requisite socioeconomic impact assessment impact assessment and unavoidable adverse effects associated with the commercial and recreational activity related to 24 fishery management alternatives. The approaches for the various alternatives are variable. However, all approaches evaluated the incremental effect of the alternatives relative to current conditions. Where possible, financial impacts were projected.

Centaur Associates, Inc. *"Socio-Economic Analysis of Commercial and Recreational Fisheries in Everglades National Park."* 9-1-1986, Washington D.C., Everglades National Park, National Park Service, U.S. Department of the Interior.

This report examines the impact of fishing in Everglades National Park. It summarizes the economic impact trends for various Park fisheries and compares the economic impact of fishing in the Park with surrounding Florida areas or counties. Commercial data were compiled on the ev-vessel value of landings for Everglades National Park, the State of Florida as a whole, and the counties of Dade, Collier, and Monroe (counties surrounding the park). Multipliers were used, and 12 species of fish were identified. Recreational expenditures were split into two categories: private boat and guide party recreational fisheries.

Center for Economic and Management Research, *"Economic Impact of Commercial/Fisheries in the Florida Keys: Case-Study-Florida Keys National Marine Sanctuary."* Draft Management Plan. (Under contract to the Monroe County Commercial Fishermen, Inc.)., 1994. 12-1-1995. Tampa, FL: University of South Florida.

The purpose of this study is twofold. First, to demonstrate the level of economic activity arising from commercial seafood harvested in Monroe County, Florida. Second, to demonstrate the change in economic activity, which may be expected to arise from implementation of selected fishery restrictions. This included restrictions such as those proposed by the Florida Key National Marine Sanctuary (FKNMS). An IMPLAN input-output model was used to estimate economic impact in terms of output, income and employment in Monroe County. Economic impact was estimated for 1994 using Monroe County landings of finfish and shellfish for that year. A survey of Monroe County fishermen was used to derive the impacts of two proposed sanctuary replenishment reserves (Sambos and Dry Tortugas).

Central and Southern Florida Project Comprehensive Review, *"Indian River Lagoon Restoration Feasibility Study (Project Study Plan, Version 4.0)."* US Army Corps of Engineers,

South Florida Water Management District. June 1, 1996.

The Indian River Lagoon (IRL) spans some 156 miles along Florida's central east coast. It is listed as an estuary of national significance and included in the National Estuary Program. The habitat provides for a variety of commercially, recreationally, and ecologically important aquatic organisms. The IRL Restoration Feasibility Study was initiated in July 1996. It examined alternative surface water management options and developed a regional plan for addressing water resource opportunities specific to the canal watershed in Martin and St. Lucie counties. Two major goals of the study included enhancing ecological values and enhancing economic values and social well being.

Cofer-Shabica, S.V., Snow, R.E., and Noe, F.P., *"Formulating policies using visitor perceptions of Biscayne National Park and seashore."* Recreational Uses of Coastal Areas Paolo Fabbri, ed., Kluwer Academic Publishers, Norwell, MA (1990): 235-254.

Visitor surveys were handed to randomly selected visitors to the park in the winter and summer and returned by mail. A mail-out survey was sent to registered boat owners in Dade County. From a park management perspective, Biscayne's data suggest a need for sensitivity to expectations that different ethnic groups brought to the Park when designing services and programs. Data also suggested addressing issues of whether marine recreational areas should have increased development and formal control to maximize visitor satisfaction, or remain undeveloped.

Continental Shelf Associates, Inc., *"Synthesis of Available Biological, Geological, Chemical Socioeconomic, and Cultural Resource Information for the South Florida Area."* Minerals Management Service, Atlantic OCS Region. Miami, Florida. May 1, 1990.

The specific objectives of the study were to review and synthesize geological, chemical, biological, cultural resource and socioeconomic information for the study area; to evaluate potential effects of offshore oil and gas exploration and development; and to recommend mitigation measures and identify future research needs. This synthesis of existing information will help federal and state policy markers reach informed decisions about future lease offerings and environmental restrictions on offshore oil and gas operations.

Correia, Michelle Edwards and Craig Diamond, *"Application of Valuation Methodologies to South Florida Externalities."* FAU/FIU Joint Center for Environmental and Urban Problems and Resource Analysis and Management for 1000 Friends of Florida. March 14, 1995.

This paper summarizes various valuation techniques based on their applicability to the problem of simulating markets and estimating values of South Florida's environmental resources. The paper identifies the types of externalities associated with these resources and their likely sources or causes. It also lists the likely environmental impacts and the valuation techniques. The paper also makes recommendations for using externalities as a basis for policy-making in the South Florida region.

Correia, Michelle Edwards. *"Economic Impact Study of Federal Interest Lands in South*

Florida." FAU/FIU Joint Center for Environmental and Urban Problems. December 1995.

This report is a compilation of available information on the significance of: Everglades National Park; Loxahatchee National Wildlife Refuge; National Key Deer Refuge; Crocodile Lake National Wildlife Refuge; Key West National Wildlife Refuge; Great White Heron National Wildlife Refuge; Florida Panther National Wildlife Refuge; J.N. "Ding" Darling national Wildlife Refuge; and Florida Keys National Marine Sanctuary to their local economy. The study used the Money Generation Model developed by the National Park Service's Socio-Economic Studies Division. The model calculated how expenditures by tourists, the Federal government, and other non-local parties resulted in sales benefits and new job benefits.

Curtis, T.D. and E.W. Shows, *"A comparative Study of Social and Economic Benefits of Artificial Beach Nourishment – Civil Works in Northeast Florida",* Prepared for the Division of Beaches and Shores, State of Florida, STAR Grant to the University of South Florida, July 1984.

The purpose of this study was to estimate the beach use value for Jacksonville Beach in Northeast, Florida. The beach use values would be compared with nourishment cost to derive a benefit/cost ratio for the artificial nourishment of this beach. Using a contingent value (CV) approach, the mean willingness to pay for beach nourishment was an estimated $4.44 per beach user per day (in 1983 dollars) for Florida residents and $ 4.88 per beach user per day (in 1983 dollars) for out of state users. The benefit/cost ratio for the proposed project was between 2.23 and 2.46 and is thus favorable to continued beach nourishment. Direct expenditures into the local economy was estimated at $3 million by tourists while an income multiplier from 1 to 2.62 was suggested for this direct injection into the local economy.

Curtis, T.D. and E.W. Shows, *"Economic and Social Benefits of Artificial Beach Nourishment Civil Works at Delray Beach",* Prepared for the Division of Beaches and Shores, State of Florida, STAR GRANT to the University of South Florida, Tampa, Florida. September 1982.

The purpose of this study was to estimate the beach use value for Delray Beach in the West Palm Beach area of Florida. The beach use value would be used to compare to nourishment cost to derive a benefit/cost ratio for the artificial nourishment of this beach. Using a contingent value (CV) approach, the mean willingness to pay for beach nourishment was $2.07 per beach user per day (in l981 dollars) for Florida residents, and an estimated $2.09 per beach user per day (in 1991 dollars) for those from out of state. The calculation of the benefit/cost ratio of 2.2 strongly supports the conclusion that the Delray Beach nourishment project was economically viable. Direct expenditures by out of state visitors were an estimated $26.7 million into the local economy in 1981/82. A multiplier of 2.62 was suggested for this direct impact.

Davis, G.E., *"On the Role of Underwater Parks and Sanctuaries in the Management of Coastal Resources in the Southeastern United States."* Environmental Conservation,Vol. 8(1) (1981): 67-70.

Aquatic resources in parks and reserves are not as adequately protected as comparable terrestrial

resources. The seven underwater parks or sanctuaries established since l935 in Florida and the U.S. Virgins Islands exhibit wide variations in the degree of protection accorded to aquatic resources. Protection ranges from "nearly complete protection" in the first park that was established to "virtually no protection at all" in recently established parks. The consequences of permitting consumptive use of aquatic resources in parks and reserves need to be objectively evaluated. Unless these consumptive uses are significantly reduced or eliminated, the primary values of the parks and reserves may never be realized.

DeWitt, John, *"Protecting a Profitable Paradise: The National Ocean Service Leads Multi-agency Planning in the Florida Keys."* Center for Competitive Sustainable Economics, National Academy of Public Administration, Washington, D.C. August 1996.

As defined in recent work at the National Academy of Public Administration, four key elements of governance are considered. These elements are: 1) public purposes; 2) roles of public agencies and other entities; 3) tools used to achieve public purposes; and 4) strategies for change to improve performance and to adapt to new information. The paper also describes how the Keys planning process measures up to eleven criteria for marine governance which have been identified by the NAS Committee on Marine Area Governance and Management. The paper concludes with an assessment of whether NOAA's activities in the Keys have produced desired results.

Edwards Correia, Michele, Phyllis P. Saarinen, and Grace M. Johns, *"Uses and Methods of Resource Valuation."* Presentation to the Governor**?**s Commission for a Sustainable South Florida. April 6, 1995.

The document is a hard-copy version of a seminar presentation, made to the Governor's Commission for a Sustainable South Florida. The slides graphically depict the importance of natural resource valuation as an element of policy-making, and explain the use of the contingent valuation method to estimate the value of key resources such as the Everglades and the Indian River Lagoon.

English, Donald B. K., Warren Kriesel, Vernon R. Leeworthy and Peter C. Wiley. *"Economic Contribution of Recreating Visitors to the Florida Keys/Key West. From June 1995 to May 1996."* Sponsored by U.S. Forest Service, Outdoor Recreation and Wilderness Assessment Group. Athens, GA: University of Georgia, Department of Agricultural and Applied Economics. Silver Spring, MD: National Oceanic and Atmospheric Administration, Strategic Environmental Assessments Division. Fisheries Statistics of the United States. National Marine Fisheries Service. Fishery Statistics Division. November 1, 1996.

This report provides estimates of the economic impact that visitors to the Florida Keys have on both Monroe County and the larger South Florida regional economies. Estimates are made for output/sales, income, and employment and include both direct and secondary economic impacts. This report provides the basis for demonstrating the income producing asset value of the natural resources of the Florida Keys/Florida Bay. Estimated business output derived from tourist activity between June 1995 to May 1996 was $1.33 billion (i.e., 61 percent of Monroe's economy). Impact on income for the period was $0.51 million (i.e., 45 percent of Monroe's economy), and impact on

employment was ,21,848 jobs (i.e., 46 percent of Monroe's economy). The impact of tourist activities in the Florida Keys/Key West on output (sales) for the rest of South Florida (Dade and Broward Counties) was $1.61 billion. The impact on income was $1.37 billion, and the impact on employment was 8,300 fte jobs.

Environmental Economics Resource Group(EERG), *"Natural Resource Damage Assessment for the Tampa Bay Oil Spill: Recreational Use Losses for Florida Residents."* Unpublished Report to the Florida Department of Environmental Protection, February, 1998. Tallahassee, Florida.

In 1993, a tank barge collided with a freighter near the entrance of Tampa Bay causing an oil spill that flowed out into the Gulf of Mexico and came ashore on Treasure Island Beach. This damage was estimated using a random utility model (RUM) including the value of time for the month or so that the beach was unable to be used by residents of Florida. The question arose as to the WTP per day for a beach visit to the oiled beaches assuming this damage had not taken place. The RUM estimated that the daily WTP by residents to the damaged area was $22.75 per day. Estimating the number of days lost during the oiled beach period, it was concluded that damages amounted to a conservative figure of $3.98 million dollars owed to beach goers.

Finkl, Charles, *"Water Resource Management in the Florida Everglades."* Journal of Soil and Water Conservation. Volume 22; pp. 592-600. Published by Soil Conservation Society of America, Ankeny, Iowa. November-December 1995.

Fishkind and Associates, Inc., *"Economic Impact of the Manatee Sanctuary Act – Technical Report."* Volusia County Board of County Commissioners, Deland, Florida. January 1993.

This report provides an economic impact analysis for the Manatee Sanctuary Act for Volusia and Brevard counties in Florida and for the entire State of Florida. The report includes a review of the types of economic impacts of the Manatee Sanctuary Act, calculates the total costs and benefits resulting from the Act, estimates the level of net economic impact, and identifies any mitigating measures required due to the Act. The willingness to pay per household per year for the protection of the manatee was estimated at $59.

Florida Department of Community Affairs. *"An Economic Impact Statement under Chapter 120.54, F.A.C. for Rule Establishing F.A.C. 28-20; Part II: Amendment to the Monroe County Proposed Rule 28-200.100."* Tallahassee, Florida. March 1996.

This paper fulfills the requirement under Chapter 120.54, F. A. C.; an economic impact statement prior to adoption of the proposed rule for Monroe County 28-20.100, which includes amendments to the Monroe County Comprehensive Plan and Land Development Regulations. The proposed amendments address local funding initiatives, and alternatives for implementation of the plan; use of the County's Point Allocation System to direct development away from important natural resources and maintain acceptable hurricane evacuation times; and development controls which adequately protect hammocks, pinelands, wetlands, marine resources and water quality.

Florida International University, *"Visitor Survey in Florida Keys (Key Largo to Islamorada)."* Environmental Studies Department, Miami, Florida. 1997

This survey gathers visitors' information on travel profile, recreational activity types, and number of visitations under different levels of quality and quantity of attributes of SPAs (i.e., fish population, visitor congestion, water quality and coral quality).

Fogg, G. A., *"Study of South Florida Recreational Patterns."* 1-1-1990. United States Department of the Interior, National Park Service, Big Cypress National Preserve.

The goal of this study was to develop an understanding of South Florida's multifaceted user groups, and relate this information in a useful manner to the appropriate decision-makers. The information generated will enable various participating resource oriented agencies and businesses to better understand the user needs they serve and where there is room and/or need for improvement and/or expansion of Big Cypress National Preserve, (Public Law 1000-301). The National Preserve is required to identify the users of the Preserve. This report addresses, in part, these legislative requirements. It explores who is using the park and surrounding areas

Furse, J.B. and Fox, D.D., *"Economic Fishery Valuation of Five Vegetation Communities in Lake Okeechobee, Florida."* Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies Vol. 48 (1994). Pp.575-591.

Vegetated areas of the littoral zone of Lake Okeechobee were sampled with 0.8-ha block nets during the fall of l989, l990, and l991 to estimate fish assemblages and standing crops in 5 vegetation communities common in Florida. Data were used in conjunction with economic impact data of known cause fish kill events, Rule 17-11.01(animal damage valuation), Chapter 403, Florida Statues, to estimate monetary values of the fisheries of important Lake Okeechobee vegetation communities. Mean total impact values per hectare of vegetated areas range from $44, 626 to $59,738. Replacement economic values made up at least 88.9% of the total impact value in the valuation of all vegetation types. Recreational values per hectare of vegetated areas ranged from $447 to $5,378.

Glasure, Yong Un. , "*An Economic Evaluation of the Florida Saltwater Resident Recreational Fishery*," Doctoral Dissertation, Florida State University, 1987, Tallahassee, Florida.

The purpose of this study was to estimate the displayed use value of saltwater recreational fishing for Florida residents. A sample of 1,002 resident saltwater anglers in Florida was used. The sample was collected between July 1980 and June 1981. The model used for deriving use value for all saltwater species was a variation of the travel cost and the Gibbs approach.. The travel cost method was rejected in favor of the Gibbs approach. Use value was estimated at $142.31 per resident angler day (expressed in 1981 dollars). The estimated daily used value $13.26 per saltwater angler day.

Governor's Commission for a Sustainable South Florida, "*Initial Report"*, Coral Gables, Florida, August 1996.

The Initial Report details the Commission's conclusions regarding the present state of South Florida and offers 110 recommendations for the future of the region with a central theme of sustainability. Three broad components are identified: society, economy, and the environment. Then concludes that these must be fully integrated and balanced to achieve sustainability in South Florida. These components encompass a variety of human and natural system issues that are closely intertwined and require a holistic approach.

Governor's Commission for a Sustainable South Florida, "*A Conceptual Plan for the C&SF Project Restudy."* Coral Gables, Florida, August 1996.

The C&SF Project is a predominant feature affecting water resources in South Florida. Modifications to the existing project, termed the "Restudy," are crucial to restore South Florida's water quality, flood protection, and water supply for the agriculture and urban areas as well as the natural system. This study describes the Commission's preferred alternatives to the US Army Corps of Engineers and the South Florida Water Management District and other agencies that pursue the Restudy. The Commission, selected a list of 40 preferred options to be evaluated, and designed these options to improve and expedite the Restudy efforts.

Green, Gretchen, C.B. Moss and E. M. Thunberg, "Estimation of Recreational Anglers" Value of Reef Fish in the Gulf of Mexico", Unpublished Paper under Contract with the National Marine Fisheries Service, USDC, Marine Fisheries Initiative Program, St. Petersburg, Fl. 1992.

Several public policy issues in the Gulf of Mexico region involve the value of the reef-fish recreational fishery. This study estimates the economic impact of this fishery using a travel cost procedure. Demand for recreational reef fishing is estimated as a function of travel costs and other costs paid, and success of catch. The results indicate that a 20% reduction in the average catch reduces expenditures by $32.1 million. The fishery is estimated to generate $385.6 million in total expenditures within the State of Florida annually. Using the travel cost method in conjunction with the MRFSS data, the authors conclude that reef fish caught off Florida generates $675.52 per trip for each angler (expressed in l991 dollars).

Green, Gretchen, C.B. Moss and T.H. Spreen, "Demand for Recreational Fishing in Tampa Bay, Florida: A Random Utility Approach", Marine Resource Economics, Vol. 12, 1997, 293-305.

An estimation of demand for recreational fishing in Tampa Bay, Florida, can facilitate the environmental management of the bay. A nested random utility (RUM) travel cost model was used to estimate access values to Tampa Bay. Average value of welfare losses per resident angler were calculated at $1.68 per trip for the loss of the bay itself and $3.66 for the loss of both the bay and Pinellas County together (expressed in 1992 dollars). Because of large number of substitute water bodies in the west central part of Florida, considered by the RUM model, the trip values per angler to the bay is relatively low compared to other estimates for angling using less flexible techniques.

Green, Trellis G. *"Compensating and Equivalent Variation of Florida Saltwater Tourist Fishery."*

1980-81. 1-1-1984. Doctoral Dissertation: Florida State University, Tallahassee, Florida.

The purpose of this study was to estimate the use value (i.e., consumer surplus) for the tourist recreational marine angler visiting Florida. Estimates of use value covered all marine species and modes of fishing in the aggregate. The Gibbs on-site model was used to estimate the demand curve for the Florida tourist engaged in saltwater fishing. The equivalent and compensating variation versions were estimated between $43.83 and $40.31 respectively per angler day (in 1981 dollars). Based upon a compensating variation (CV) estimate of $46.17, the asset value of the tourist saltwater fishery in Florida was estimated at $10 billion using a 7.6% discount rate. Among marine angler modes, CV was estimated at $11.67 and $38.89 per day for shore and offshore respectively. The offshore modes ranged from a high of $89.33 per day for charter boats to a low of $15.77 for those engaged in reef fishing by any kind of mode. Finally, it was found that tourist marine anglers were relatively insensitive to changes in catch rates or fish caught per day, indicating that tourism is not heavily discouraged by a declining or over-fished fishery stock.

Hamann, Richard, "*Assessment of Water Rights, Uses, Laws and Regulations, Everglades National Park - Draft Final Report.*" National Park Service, Everglades National Park, Homestead, Florida. January 1993.

As a review and analysis of federal and Florida State water laws and regulations, this study was designed to assess the water rights of Everglades National Park. Section One examines the federal law of water rights, exploring the extent to which the federal government may have rights under federal law for delivery of water to the Park. Section Two focuses on state law governing water rights in Florida, the Water Resources Act of 1972, and the common law in effect before then. It discusses ways in which the water rights of Everglades National Park can be protected under Florida law.

Harwell, Mark A. and John F. Long, "*U.S. Man and the Biosphere Program Human-Dominated Systems Directorate: Workshop on Ecological Endpoints and Sustainability Goals.*" University of Miami, Rosenstiel School of Marine and Atmospheric Science. United States Man and the Biosphere Program. Department of State, Washington, D.C. 20520-7818. May 1992.

The ultimate objective of the HDS core project is to develop a process or approach that can be used to better integrate ecological and societal issues, extending beyond the specifics of the three case studies analyzed in this workshop: the Everglades, Pinelands, and Virginia Coastal Reserve. The goals of the core project are to:1) define ecological sustainability in terms of ecological endpoints, 2) evaluate the patterns of human uses of environmental resources and other anthropogenic stresses imposed on the ecosystems, 3) examine societal and institutional factors influencing ecological sustainability, and 4) assess the potential for various societal policies and institutions to be compatible with essential characteristics of ecological sustainability. It is clear that the most important sustainability goal for the South Florida region is the reestablishment and maintenance of hydroperiod and water quantity within the historical pattern.

Hazen and Sawyer, P.C., in association with HSW Engineering "*Statement of Estimated*

Regulatory Costs for Revisions to Florida Administrative Code Regarding Minimum Flows and Levels in the Northern Tampa Bay Area." Prepared for the Southwest Florida Water Management District, Brooksville, Florida, November 25, 1998.

As required by Florida Statutes, the Southwest Florida Water Management District established minimum flows and levels and, where appropriate, recovery strategies for the following water resources in the Northern Tampa Bay area. (1) Floridan aquifer levels and wetland levels within the Northern Tampa Bay Water Resources Assessment Program study area; (2) fifteen Northern Tampa Bay area lakes; (3) the lower Hillsborough River and (4) the Tampa Bypass Canal.

In accordance with Florida Statutes, a *Statement of Estimated Regulatory Costs (SERC)* was prepared. This SERC provides a good faith estimate of the number and types of individuals and entities likely to be required to comply with the rule. It also estimates the cost to the agency (District) to implement and enforce the rule, and the direct costs likely to be incurred by those complying with the rule. The SERC also reviews the impact of the rule on small businesses, small counties and small cities, and a description of the benefits associated with adopting the rule.

Hazen and Sawyer, P.C., in association with Natural Resource Damage Assessment, Inc. "*Economic Benefit Evaluation of Everglades Restoration and Preservation.*" Prepared for South Florida Water Management District. Contract Completion Report - Contract No. C-3172. October 1992.

This study provides value estimates for generalized sets of damages to the Everglades ecosystem using the benefits transfer approach. These values are inferred through the use of two study methods. The first method uses the wetland function valuation approach, which values the specific outputs of the wetlands. The second method uses the contingent valuation survey approach to place a dollar value on a natural resource as a whole.

Hazen and Sawyer, P.C., in association with Resource Economics Consultants, Inc., and HSW Engineering. "*Economic Impact Statement: for Revisions to Chapter 40D-2, F.A.C., Water Use Permitting, and Chapter 40D-8, F.A.C., Water Levels and Rates of Flow, Including Rules Specific to the Southern Water Use Caution Area.*" Prepared for the Southwest Florida Water Management District." Project No. P261. November 15, 1994.

Under certain conditions, Florida Statutes require that, prior to adopting a rule revision, an economic impact statement describing the impacts to all persons directly affected by the proposed revision should be prepared. This study is a comprehensive evaluation of the costs and benefits associated with implementation, monitoring, and complying with the proposed rule. Cost and benefits to all types of water use permittees are described and/or estimated. District and other government agencies are studied; large users and small business interests are evaluated; and potential alternative methods to the rule are described.

Hazen and Sawyer, P.C., "*Analysis of Economic Impact: Water Quality Programs, Lake Okeechobee Watershed.*" Prepared for the South Florida Water Management District. Final Report,

Contract No. C-5138. October 1995. (see also Boggess, Johns and Meline)

This "ex-post" study estimates the economic impacts of the dairy programs north of Lake Okeechobee during and after their implementation period (1987 to 1993). All impacts were measured as the difference between what would have likely occurred without these programs versus what actually occurred. The study found that much of the observed slowdown in economic activity during the study period was due to the national recession. However, the negative economic impact of the dairy programs was evident from the available data. The impact of these programs was a three to seven percent contraction of the Okeechobee County economy during the study period (depending on the year) and less than one percent contraction of the larger regional economy.

Hazen and Sawyer, P.C., "*Economic Assessment of Recreational and Commercial Uses of Orange and Lochloosa Lakes in the Orange Creek Basin,"* prepared for the St. Johns River Water Management District. Palatka, Florida. Final Report, September, 1997.

This study describes the recreational and commercial uses associated with Orange and Lochloosa Lakes, in North Central Florida. The study found that, during the 1990s, there were significant declines in recreational fishing activity and local income associated with the lakes. Total annual recreational fishing expenditures in the study area were an estimated $6.2 million annually from 1985 to 1998 and then fell to a low of $2.4 million in 1994. Total annual income to all businesses in the study area that was generated from fishing at Orange and Lochloosa Lakes was estimated to be $1.8 million from 1985 to 1988. This total income fell to a low of $679,000 in 1993. In 1996, total income from recreational fishing at the lakes recovered a bit to almost $1 million.

Hazen and Sawyer, P.C., "*Economic Incentive Approaches to Water Resources Management,"* Prepared for the Southwest Florida Water Management District. Contract No. 95CON000104. March 1997.

This report evaluates methods that create economic incentives to individuals, water utilities, and businesses to conserve freshwater and develop alternative water supplies within the Southwest Florida Water Management District area. The methods are evaluated in terms of (1) maximizing the efficiency in allocating water to permittees; (2) improving the efficiency of water use by permittees; and (3) promoting the development of economically feasible alternative water sources

Hazen and Sawyer, P.C., "*Estimated Economic Value of Resources."* Prepared for the Charlotte Harbor National Estuary Program. North Fort Myers, Florida. Report, March 5, 1998.

In preparation for its Comprehensive Conservation and Management Plan (CCMP), Charlotte Harbor NEP commissioned an evaluation of the economic value of resources within the Charlotte Harbor watershed. The study estimated consumer surplus and total income values associated with the natural resources of the Charlotte Harbor watershed. Non-market values of the watershed were estimated using benefits transfer. IMPLAN multipliers were used to estimate total income for the region. The study found that the Charlotte Harbor National Estuary provides about $1.8 billion per year in net value to recreators and Florida households, and was used to produce about $3.2 billion

per year in income to the area.

Hazen and Sawyer, P.C., "*Funding Source Inventory for Comprehensive Conservation and Management Action Plans."* Prepared for the Tampa Bay National Estuary Program (TBNEP), February 1996.

This study identifies alternative funding sources to support the CCMP action plans including existing local, state and federal funding sources for which TBNEP could qualify. This study also identified the current funding sources and levels for existing programs that protect the environmental resources of the Tampa Bay estuary. This study is a resource document for environmental project funding within the Tampa Bay area.

Hazen and Sawyer, P.C., "*Twenty Year Evaluation: Economic Impacts from Implementing the Marjory Stoneman Douglas Everglades Restoration Act and the United States Versus SFWMD Settlement Agreement." Contract Completion Report."* Prepared for the South Florida Water Management District. Contract No. C-4157. August 1993.

In 1992 and 1993, a regional and statewide economic impact analysis was prepared to estimate the "ex-ante" changes in sales, earnings and employment that could be expected from alternative stormwater management programs in the Everglades, Agricultural Area (EAA). The study's forecast period was 1994 through 2013. Overall, the regional economy, which includes Palm Beach and Hendry counties, was expected to expand by about seven percent from 1994 to 1996 due to construction of the STAs. Beginning in 1997, the regional economy will shrink by about four percent relative to baseline projections because construction of the STAs would be completed and the job losses associated with the lost agricultural production on the STAs would be felt.

Hershman, Karyn L., *"Water for the Everglades: The Evolution of Water Policy in South Florida."* M.A. Thesis, University of Virginia, Charlottesville, Virginia. May 1994.

This study gives a history of Everglades water supply issues and policies. It points out the often-contradictory objectives of these policies. Over the years, policy regarding water for the Everglades has been one of crisis management rather than the development of policies to guide water management. For this study, interviews with relevant experts and reviews of primary and secondary water policy documents were made and descriptions of the impacts of these policies on the Everglades ecosystem were given.

Jansen, D.K., *"Big Cypress Public Use Study, July 1983 - June 1986."* U.S. Department of the Interior, National Park Service, Big Cypress National Preserve.

Through personal interviews, the study determines that the most popular activity of park users was hunting. Fishing and frogging are other park uses. The survey gives demographic information and describes the activities of the average park user.

Kleppel, G.S. and The Estuarine Theme Panel, "*Part 1. A Synopsis of Florida's Estuarine*

Resources with Recommendations for their Conservation and Management," Review Draft Florida Sea Grant College Program, University of Florida, Gainesville, Florida. October 1996.

This report describes the current status or condition of Florida's estuaries. The findings will help to develop an agenda for researchers associated with the Florida Sea Grant and Florida Coastal Management Programs. Contributors to the report were selected for being authorities within their selected areas of specialty. The report is the first of two volumes. The first volume has a broader audience and is therefore written to ensure easy understanding by scientists and non-scientists alike. This report also identifies data gaps and categorizes them as areas that require additional research.

Leeworthy, V.R. and D. Schruefer, *"A Socioeconomic Profile of Recreationists at Public Outdoor Recreation Sites in Coastal Areas: Volume 4."* 1-1-1990. Rockville, Maryland, National Oceanic and Atmospheric Administration.

This report summarizes information collected during the winter and spring of 1989 through surveys conducted at four state parks in Florida. Florida residents and out-of-state visitors were sampled regarding their activities in the parks and their willingness to pay for the use of these parks. The visitors were also asked to rate the parks regarding facilities and other characteristics. The willingness to pay per day per person to use the park was estimated as follows: Hugh Taylor Birch SRA - $.31; Coral Reef State Park - $.57; Honeymoon Island SRA - $.26 and Everglades National Park - $.61.

Leeworthy, V.R. and J.M Bowker, *"Non-market Economic User Values of the Florida Keys/Key West. June 1995 - May 1996."* 10-1-1997. Silver Spring, MD: National Oceanic and Atmospheric Administration, Strategic Environmental Assessments Division; Athens, GA: U.S. Forest Service, Outdoor Recreation and Wilderness Assessment Group.

This study estimated the use value of various forms of outdoor recreation involving visitors to the Florida Keys/Key West area. Use values were estimated from the basic travel cost model without the value of time using statistical techniques called the truncated Poisson and truncated negative binomial. These values were obtained from a sample of 4,360 visitors over the l995-96 period. Day -trippers to the area were very sensitive to price while others, except Hispanics, were not highly sensitive to price with respect to a reduction. The total annual use value for various recreational activities was estimated at about - $.9 billion dollars. When capitalized at a discount rate of 3%, the asset or capitalized value was about - $30.1 billion for just the visitor segment of use value in the Florida Keys/Key West.

Leeworthy, V.R. and P.C. Wiley, *"Importance and Satisfaction Ratings by Recreating Visitors to the Florida Keys/Key West. June 1995 - May 1996."* 11-1-1996. Silver Spring, MD: National Oceanic and Atmospheric Administration, Strategic Environmental Assessments Division.

This report provides an easy-to-use analytical framework for assessing the ratings by visitors in terms of importance and satisfaction with 25 selected natural resource attributes, facilities, and services of the Florida Keys. For 11 of the 25 items, comparisons were made between visitors'

current satisfaction ratings and their ratings of these items five years prior. Statistical tests were conducted to highlight significant differences.

Leeworthy, V.R. and P.C. Wiley, *"Recreational Use Value for Clearwater Beach and Honeymoon Island State Park, Florida,"* Strategic Environmental Assessment Division, National Oceanic and Atmospheric Administration, March 1994.

The purpose of this study was to estimate the use values for Clearwater Beach and Honeymoon State Park, Florida. Using the travel cost method (TCM) with the value of time, the use value per day for Clearwater Beach, Florida was found to be - $55.96 per day per beach-goer (in l990 dollars). For Honeymoon State Park, the use value per day per user was estimated at - $14.91 (in 1990 dollars). Both estimates were for a combination of residents and visitors from out of state. It was estimated that the two recreational sites (i.e., beaches) generated over - $300 million per year (i.e., use value) and would yield an asset value of - $10 billion using a discount rate of 3%.

Leeworthy, V.R. and P.C. Wiley, *"Technical Appendix: Sampling Methodologies and Estimation Methods Applied to the Survey of Monroe County Residents. June 1996 - May 1996."* 10-1-1997. Silver Spring, MD: National Oceanic and Atmospheric Administration, Strategic Environmental Assessments Division.

This document was prepared to provide detailed documentation of how various measurements were derived and reported for residents of Monroe County in "A Socioeconomic Analysis of Recreation Activities of Monroe County Residents in the Florida Keys/Key West". Chapter 1 provides details on sampling methodologies and methods for estimating the total number of Monroe County residents that participated in outdoor recreation activities in the Florida Keys/Key West. Chapter 2 documents the sample weighting methods for both the telephone and mailback samples. Chapter 3 provides details on the results of analyses conducted to determine the existence of non-response bias in the various mailback surveys. Chapter 4 documents the methods used to estimate participation rates and the total number of participants in 66 recreation activities in four regions of the Florida Keys. It also documents how intensity of use was estimated for 37 selected activities by region.

Leeworthy, V.R. and P.C. Wiley, *"Visitor Profiles: Florida Keys/Key West. June 1995 - May 1996."* 11-1-1996. Silver Spring, MD: National Oceanic and Atmospheric Administration, Strategic Environmental Assessments Division.

This report summarized the results of an extensive survey of visitors. Included is information on the number of visitors and number of days, place of residence age, sex, race/ethnicity, income, education, employment, recreation activity participation and extent of use by region and season, and detailed spending profiles. Multi-dimensional views of visitors to the Florida Keys were presented. Dimensions included views by season, mode of access (e.g., Auto, Air and Cruise Ship), and domestic vs. foreign visitors.

Leeworthy, V.R. and P.C. Wiley, *"A Socioeconomic Analysis of the Recreation Activities of*

Monroe County Residents in the Florida Keys/Key West." 8-1-1997. Silver Spring, MD: National Oceanic and Atmospheric Administration, Strategic Environmental Assessments Division.

This report describes the results from a 1996 survey of Monroe County residents. The survey used a combination of telephone and mail back contacts to generate the samples. Over 2,900 Monroe County households completed the telephone survey and over 600 completed the mail back portion of the survey. The telephone sample was used to collect information on the demographic characteristics of Monroe County households, participation in outdoor recreation activities in the Florida Keys/Keys West, ratings of the quality of life in Monroe County, and the primary reason for locating in Monroe County. The mail back survey collected detailed information on the types of activities and intensity of involvement.

Leeworthy, V.R., *"An Economic Allocation of Fishery Stocks Between Recreational and Commercial Fishermen: The Case of King Mackerel."* 1986. 9-1-1990. Doctoral Dissertation: Florida State University.

A short run economic allocation model was implemented to test whether the 1986 allocation of catch between recreational and commercial fishers maximized the net value of the king mackerel resource or whether the maximum sales, employment and wages impact on the Florida economy was achieved by the 1986 allocation. Using the simple travel cost model for recreational anglers (i.e., both tourists and residents) without the value of time, it was found that the best estimate of use value of the king mackerel resource was $45.60 per resident/tourist angler trip, in 1986 dollars. The asset value of the east and west coasts king mackerel resource to recreational anglers was estimated at -$2.8 billion.

Leeworthy, V.R., *"Potential Losses to the Commercial Fishing Industry in Monroe County Resulting from the Sambos Ecological Reserve."* 1994. 12-1-1996. Silver Spring, MD: National Oceanic and Atmospheric Administration, Strategic Environmental Assessments Division.

This paper documents the estimated potential impacts on small businesses, especially the commercial fishing industry, resulting from the prohibition of fishing due to sanctuary regulations in the Sambos Ecological Reserve. The maximum loss assuming that a fishing enterprise cannot replace the lost catch was estimated at $8,801 per commercial fishing enterprise. This loss represented the returns to capital and labor for the fishing enterprise. The maximum loss per seafood dealers/processor to capital and labor was estimated at $9,577.

Leeworthy, V.R., *"Recreational Use Value for John Pennekamp Coral Reef State Park and key Largo National Marine Sanctuary."* Winter, 1988 - Spring, 1989. 5-1-1991. Rockville, MD: National Oceanic and Atmospheric Administration.

The purpose of this study was to estimate the use value of John Pennekamp Coral Reef State Park and Key Largo National Marine Sanctuary in Florida, which provides recreational activities including diving, boating and other park-related activities. A sample of 342 visitors (i.e., residents and out-of-state tourists) to this area was analyzed using data from 1989. The travel cost method was

used to estimate the use value of this area with and without the value of time. The author feels that a realistic estimate of use value for the park is between $285 and $426 per day or an average of $356, in l989 dollars.

Leeworthy, V.R., *"Technical Appendix: Sampling Methodologies and Estimation Methods Applied to the Florida Keys/Key West Visitors Surveys. June 1995 - May 1996."* 12-1-1996. Silver Spring, MD: National Oceanic and Atmospheric Administration, Strategic Environmental Assessments Division.

This document was prepared to provide detailed documentation on how various measurements were derived as reported for visitors to the Florida Key/Key West in "Visitor Profiles: Florida Keys/Key West " (Leeworthy and Wiley 1996) and "Economic Contribution of Recreating Visitors to the Florida Keys/Key West (English et al 1996). This document is intended for researchers that want to do further analyses with the visitor data and may want to replicate the study in the future. Chapter 1 provides details on the sampling methodologies and methods for estimating the total number of visitors or person-trips (visits) and the number of person-days of visitation. Chapter 2 documents the sample weighting applied to both the on-site and mail-back samples. Chapter 3 provides details on the results of analyses conducted to determine the existence of non-response bias in the various mail-back surveys. Chapter 4 documents the methods used to estimate participation rates and the total number of participants in each activity by seasons. Finally, Chapter 5 documents the methods used for estimating the economic contribution visitors had on Monroe County.

Leeworthy, V.R., Schruefer, D.S. and P.C. Wiley, *"A Socioeconomic Profile of Recreationists at Public Outdoor Recreation Sites in Coastal Areas." Volume 6,* April 1991, Rockville, Maryland, National Oceanic and Atmospheric Administration.

This study continued the work of Volume 4 under Leeworthy and Schruefer (1990) contained in this bibliography. The reader is referred to that citation for details on the entire study. In this volume, two sites in Florida were included. These sites were Clearwater City Beaches and Daytona Beach City Beaches. All visitors (Floridians and out of state) were willing to pay - $5.85 and - $9.25 for an annual vehicle pass covering all individuals in the vehicle respectively. For these two beaches, the group size and visits per year were (l) Clearwater: 3.27; 10.79 and (2) Daytona: 2.61; 16.03. The value for each beach-goer was - $.17 per day for Clearwater and - $.14 per day for Daytona.

Leeworthy, Vernon R., "Personal communication: Estimates from NOAA's Public Area Recreation Visitors Survey (PARVS) in Coastal Areas." Special Projects Office, National Ocean Service, National Oceanic and Atmospheric Administration: Silver Spring, MD. 1999.

NOAA surveyed nine sites in Florida between 1987 and 1990. Travel cost models were estimated for all nine sites but results were only published for three of the sites. Dr. Leeworthy supplied estimates for the other six sites. Travel cost models were estimated in a variety of specifications including a variety of functional forms using ordinary least squares and Poisson and negative binomial models with truncation using maximum likelihood methods. Best model results were reported. All models reported did not include the value of time. Survey samples were of all visitors

(residents and visitors). Consumer's surplus values per person per day (in 1998 dollars) were:$31.19 for Gulf Islands National Seashore, $34.27 for Hugh Taylor Birch State Recreation Area/Ft. Lauderdale Beach, $32.06 for Daytona Beach, $42.59 for St. George Island State Park, $47.76 for St. Andrews State Recreation Area, and $79.37 for the coastal portion of Everglades National Park.

Lin, C-T. Jordan, and J. Walter Milon. "Contingent Valuation of Health Risk Reductions for Shellfish Products." In Caswell, Julie A., ed. *Valuing Food Safety and Nutrition*, Westview Press, Boulder, CO, 1995.
Study Classification: risk valuation
Prepared by: DWC

Introduces the contingent valuation method for valuing the reductions in heath risks associated with the consumption of shellfish products (in the Southeastern U.S., including Florida). The purpose of the analysis was to investigate 1) the relationship between valuation and the magnitude of food-borne risk reductions and 2) whether risk information presented in relative terms and in absolute terms produces different valuation responses. A survey of 1,094 respondents in the Southeast was conducted in early 1990 that asked respondents about their oyster consumption and preferences. The estimated mean WTP to reduce the heath risk from eating oysters relative to the health risk associated with eating chicken ranged from $0.54 to $0.73 depending on the question format and treatment of outliers. The estimated mean WTP to reduce the absolute heath risk from eating oysters ranged from $0.54 to $0.80 depending on the treatment of outliers and the level of absolute risk reduction considered

Marion, Jeffrey L., Joseph W. Roggenbuck, and Robert E. Manning, *"Problems and Practices in Backcountry Recreation Management: A Survey of National Park Service Managers."* National Resources Report NPS/NRVT-NRR-93/12.. Denver, Colorado, U.S. Department of the Interior, National Park Service. Natural Resources Publication Office. October 1993.

The objective of this study was to describe the nature and diversity of visitor-related backcountry (described as primitive, undeveloped portions of the parks) management problems, practices, and solutions in National Park Service areas. Mail-back questionnaires were sent to 106 National Park Service units, including Biscayne National Park and Fort Jefferson National Monument, which have substantial overnight visitation. Results of the survey will arm backcountry recreation managers with a diverse array of management actions that can be applied to a variety of problems.

McClellan, David B., *"Aerial Surveys for Sea Turtles, Marine Mammals, and Vessel Activity along the Southeast Florida Coast, 1992-1996."* National Marine Fisheries Service, Southeast Fisheries Service Center, Miami, Florida. NOAA Technical Memo., NMFS-SEFSC-390. July 1996.

A cooperative agreement was established in September 1992 between the US Coast Guard Miami Air Station and the Miami Laboratory of the National Marine Fisheries Service to monitor marine animals and vessel activity in the Florida Keys. The area included the waters of Biscayne National

Park (BNP) and the proposed Florida Keys national Marine Sanctuary (FKNMS). The survey was extended north to Melbourne, Florida to include the Oculina Bank Habitat Area of Particular Concern (HAPC). Through March 21, 1996, a total of 71 surveys were completed and 1,919 sea turtles, 1,118 dolphins, and 12,816 vessels were documented. Sea turtle and dolphin distribution and frequency was presented from Melbourne to Key West.

Milon J. Walter and Rick Welsh, *"An Economic Analysis of Sport Fishing and the Effects of Hydrilla Management in Lake County, Florida."* Food and Resource Economics Department, Institute of Food and Agricultural Sciences (IFAS), University of Florida. Economics Report 118. July 1989.

This study used the results of a telephone and mail survey to identify sport anglers' preferences and associated economic values for aquatic plant control in Lake Harris and Lake Griffin in Lake County, Florida. The survey evaluated the effect of Hydrilla management on anglers' preference and willingness to pay for control of the aquatic weed. Total annual willingness to pay for controlling Hydrilla ranged from - $50,000 to - $176,000, depending on the level of Hydrilla preference displayed by anglers. Local anglers derived greater benefit from the lakes than non-resident anglers did. The estimated total annual lake-related expenditure in 1985 was an estimated - $1.75 million

Milon J. Walter and Rick Welsh., "An Economic Analysis of Sport Fishing and the Effects of Hydrilla Management in Lake County Florida." Food and Resource Economics Department Economics Report 118, University of Florida, Gainesville, FL, 1989.
Study Classification: valuation, economic impact
Prepared by:

This study used the results of telephone and mail surveys to identify sport anglers' preferences and associated economic values for aquatic plant control in Lake Harris and Lake Griffin in Lake County, Florida. The survey evaluated the effect of Hydrilla management on anglers' preference and willingness to pay for control of the aquatic weed. Total annual willingness to pay for controlling Hydrilla ranged from $50,000 to $176,000, depending on the level of Hydrilla preference displayed by anglers. Local anglers derived greater benefit from the lakes than non-resident anglers did. The estimated total annual lake-related expenditure in 1985 was an estimated $1.75 million.

Milon J. Walter, Jay Yingling and John E. Reynolds, "An Economic Analysis of the Benefits of Aquatic Weed Control in North-Central Florida." Food and Resource Economics Department Economics Report 113, University of Florida, Gainesville, FL, 1986.
Study Classification: economic impact
Prepared by:

This study was conducted to: identify fishing use of freshwater sites in North-Central Florida; determine anglers' preferences for alternative levels of aquatic weed control, estimate the economic impact of recreational fishing on two North Florida lakes, and estimate the economic value of alternative levels of aquatic weed control on both lakes. A mail survey was used to collect primary data to conduct the analysis. The analysis concluded that the annual economic benefits of maintaining a weed control program for both lakes in 1985 was an estimated $383,063. Total annual gross expenditures by local and non-resident anglers was an estimated $5.6 million. Multiplier effects determined that the total economic activity was an estimated $10.8 million per year. The study demonstrated that survey research could be used to identify user group preferences for aquatic weed control and the economic benefits and impacts of such controls.

Milon, J. Walter and Arbindra Rimal. "Substitution, Sequencing and Starting Point Effects in the Valuation of Composite Environmental Goods." Food and Resource Economics Department Staff Paper, University of Florida, Gainesville, FL, 1997.
Study Classification: valuation
Prepared by: DWC

Presents the results from a contingent valuation experiment with survey data from the Indian River Lagoon National Estuary Program (see Apogee Research et al. 1996) and the Coastal Resources Survey (see Milon et al. 1998a). The study estimated willingness to pay for various combinations of six different environmental programs: sea grass restoration and protection, sea turtle protection, coral reef restoration and protection, wetland conservation measures, a wetland restoration trust fund, and stormwater controls. The mean annual willingness to pay for the individual Indian River Lagoon environmental programs ranged from $58.71 to $112.05 and from $79.25 to $405.02 for the combined programs. Similarly, the mean annual willingness to pay for the individual Coastal Resources Survey environmental programs ranged from $1.36 to $65.39 and from $46.61 to $216.90 for the combined programs.

Milon, J. Walter and Eric M. Thunberg, Charles M. Adams, John C. Crotts, Stephen M. Holland, C.T. Jordan Lin. "A Regional Analysis of Current and Future Florida Resident Participation in Marine Recreational Fishing. Florida." Sea Grant Report No. 112, University of Florida, Gainesville, FL, 1993.
Study Classification: economic impact
Prepared by: DWC

Describes and summarizes the results from a statewide survey of Florida households regarding their participation in marine recreational fishing, their motivations for fishing, and attitudes toward management of Florida's fisheries. Data from the survey were used to estimate a forecasting model to project recreational fishing in seven Florida regions through the year 2010.

Statistical results from the survey showed that anglers were more likely to be white males, younger, come from larger households, and have higher income than non-anglers. The portion of resident angler expenditures related to wholesale and retail goods produced in Florida contributed to a total value of economic output associated with marine recreational fishing of $949.1 for the State. Anglers cited enjoyment of nature, relaxation, and the challenge of catching fish as important motivations for fishing. Also, the majority of anglers preferred to catch and release fish and they supported the use of bag limits to control recreational catch.

Milon, J. Walter and Pamela H. Riddle. "Employment and Sales Characteristics of Florida's Recreational Boating Industry." Florida Sea Grant Report No. 52, University of Florida, Gainesville, FL, 1982.
Study Classification: industry analysis

The purpose of this report was to provide economic information on Florida's marine recreation industry with particular emphasis on the characteristics of employment and sales in recreational boating. Important findings from the report include:

- From 1964 to 1981, the number of recreational boats registered in Florida increased by 360,010 (298 percent) and the number of recreational boats per thousand residents increased from 21.4 boats to 47.6 boats. Boat registration data in the ten largest boating counties reflect differences in the types of recreational boating enjoyed in Florida.

- Florida's market accounted for 10.5 percent of the national market for retail sales of boats, motors, trailers and marine accessories during 1980. Retail sales for marine recreation in Florida increased 313 percent from 1970 to 1981.

- Wages of employees in the boat building and repairing sector were considerably higher than the minimum wage, but lower than wages in total manufacturing. Labor turnover rates were high in the boat/ship building and repairing sectors compared to labor turnover rates for total manufacturing.

Milon, J. Walter, *"The Economic Benefits of Artificial Reefs: An Analyses of the Dade County, Florida Reef System."* Florida Sea Grant Report, SGR-90. University of Florida, Gainesville, 1988.

This report presents results from a research project to identify recreational uses of artificial reefs by private boat owners in Dade County, Florida and to evaluate merits of alternative methods to measure the economic benefits of artificial reef development. Results are from a mail survey of registered boat owners in 1985 of which 29% used artificial reefs when fishing during the survey period. Catch rates at artificial reef site were generally higher than at non-reef sites. One major purpose of this study was to estimate the use value of fishing in conjunction with artificial reefs. First, the contingent value method was employed (CVM) in three different ways: (l) Open ended/Voluntary; (2) Referendum and (3) Bidding Game. The annual user values for these three methodologies were - $18.04; - $19.75 and - $26.57 per user of artificial reefs. The capitalized or asset value of the reef system off Dade County was estimated - $128.3 million using a discount rate of 3%.

Milon, J. Walter, Charles M. Adams, and David W. Carter. "Floridians' Attitudes about the Environment and Coastal Marine Resources." Florida Sea Grant Technical Paper 95, August 1998a, University of Florida, Gainesville, FL.
Study Classification: attitudes analysis

Provides a description of a research project designed to assess Floridians' attitudes about the environment and coastal marine resources and their support for programs to protect these resources. A statewide survey of nearly 1,800 adult residents elicited information on: preferences for expenditures on various state programs, attitudes about the environment and specific marine resources, participation in coastal recreation activities, and general socioeconomic and demographic characteristics. The survey results indicate that Floridians are broadly committed to an "environmentally oriented world view." They are concerned about the health of coastal resources and the adequacy of existing programs to protect these resources. While there were differences in the intensity of these attitudes across respondents, the consistency of the responses indicates that these attitudes are not random and idiosyncratic, but rather, reflect the personal philosophies, interests, and experiences of the respondents.

Milon, J. Walter, Clyde F. Kiker, and Donna J. Lee. "Adaptive Ecosystem Management and the Florida Everglades: More than Trial-and-Error?" *Water Resources Update* 113(1998d): 37 - 46.
Study Classification: policy

Updates the paper by Milon, Kiker, and Lee published in the Journal of Agricultural and Applied Economics. Discussion is extended to include an evaluation of how adaptive management principles have been utilized to deal with the diverse and complex problem of the Everglades/South Florida restoration. Three main issues are highlighted: the interaction between water demand and supply used in the modeling and evaluation process; the use of natural and social sciences in developing plan alternatives; and the expected use of monitoring and decision making during the implementation.

Milon, J. Walter, Clyde F. Kiker, and Donna J. Lee. "Conflict and Cooperation on Trans-Boundary Water Resources." In Just, Richard and Sinaia Netanyahu, eds. *Ecosystems and Social Conflict: Lessons from the Florida Everglades*. Kluwer Academic Publishers, Boston, MA, 1998c.
Study Classification: policy

A heuristic framework is presented to consider the interplay between ecosystems and social institutions in "ecological-economic organizations." The framework is used to compare three periods in the historical development of the Everglades to illustrate the changes in the ecologic-economic organization of the South Florida region. The analysis indicates a social adaptation process leading to a transformation of ecosystem attributes and, ultimately, to centralized management. It remains to be determined whether new initiatives to restore the ecosystem can succeed without causing more social conflict.

Milon, J. Walter, Clyde F. Kiker, and Donna J. Lee. "Ecosystem Management and the Florida Everglades: The Role of Social Scientists." *Journal of Agricultural and Applied Economics* 29(1997): 99-107.
Study Classification: policy

Discusses role of the social sciences in the ecosystem management approach to environmental protection and regulation with special reference to the Florida Everglades. An adaptive procedure to guide interdisciplinary research is described and illustrated with highlights of recent progress and pitfalls from the restoration initiative for the Everglades/South Florida ecosystem. Two components of the Central and Southern Florida Project Restudy are pointed out as areas that scientists should address in an interdisciplinary setting. These components are: agricultural land use, water quality, and terrestrial habitat, and hydroperiods, terrestrial and marine habitats, and wildlife.

Milon, J. Walter, Daniel O. Suman, Manoj Shivlani, and Kathryn A. Cochran, "*Commercial Fishers' Perceptions of Marine Reserves for the Florida Keys National Marine Sanctuary."* Florida Sea Grant College Program. Technical Paper Number 89. Florida Sea Grant College Program, University of Florida, Gainesville, Florida. December 1997.

This report presents the results of a survey in the Florida Keys of commercial fishers' perceptions and attitudes about NOAA's Draft Management Plan and the proposed replenishment plan. Personal interviews were conducted with 337 fishers to determine their fishing effort and catch within the Florida Keys National Marine Sanctuary, participation in the process of developing the management plan, and their perceptions and attitudes.

Milon, J. Walter, Daniel O. Suman, Manoj Shivlani, and Kathryn A. Cochran. "Commercial Fishers' Perceptions of Marine Reserves for the Florida Keys national Marine Sanctuary." Florida Sea Grant Report TP-89, University of Florida, Gainesville, FL, 1997
Study Classification: attitudes analysis

Presents the results of a survey of 337 commercial fisher's in the Florida Keys regarding their perceptions and attitudes about NOAA's Draft Management Plan for the Florida Keys National Marine Sanctuary (FKNMS) and the proposed replenishment reserves. Information on fishing effort and catch (by species) within the FKNMS and participation in the Plan development process was also collected. A large majority did not believe that stocks of commercially important species such as spiny lobster and reef fish would increase outside the reserve area. Most believed that the primary effect would be to conserve and protect corals, fishes, and other marine life within the boundaries of each reserve. Respondents were nearly unanimous in their opinion that recreational divers, not commercial and recreational fishers, would be the primary beneficiaries of the proposed reserves and that there would not be a positive long-term effect on the economy in the Keys.

Milon, J. Walter, David Mulkey, Pamela H. Riddle, and Gary H. Wilkowske. "Economic Impact of Marine Recreational Boating on the Florida Economy." Florida Sea Grant Report No. 54, University of Florida, Gainesville, FL, 1983.
Study Classification: economic impact

Presents the results of an input-output analysis of Florida's recreational boating industry. The purpose was to identify the output, employment, and income directly produced by the industry and to estimate the indirect and induced effects of the industry on other Florida industries. Results of the analysis were that in 1980 the industry: employed approximately 15,300 employees, paid $232 million in wages and salaries, produced total output valued at $752 million, and contributed $345 million of value added. Including secondary effects the impacts of the industry 1980 can be summarized as follows: total employment was 30,000 employees; total income generated was $543 million; and total economic activity associated with the industry was $1.5 billion.

Milon, J. Walter, Eric M. Thunberg, Charles M. Adams, and C.T. Jordan Lin, *"Recreational Anglers' Valuation of Near-Shore Marine Fisheries in Florida."* Prepared for the Florida Marine Fisheries Commission under Contract No. C-705, from the Florida Department of Natural Resources. Food and Resource Economics Department, University of Florida, Gainesville, Florida. January 1994.

This report describes and summarizes the results from a statewide survey of Florida resident saltwater anglers. The researchers use the contingent valuation method to collect angler responses regarding their willingness to pay for proposed management changes associated with selected marine species. Findings from the study showed that recreational anglers did place an economic value on marginal changes in catch regulations. However, a high percentage or respondents gave a zero willingness to pay; interpreted as: they placed no value on the particular management changes that were presented.

Milon, J. Walter, Eric M. Thunberg, Charles M. Adams, and C.T. Jordan Lin. "Recreational Anglers Valuation of Near-Shore Marine Fisheries in Florida." Prepared for the Florida Marine Fisheries Commission under Contract No. C-705, from the Florida Department of Natural Resources. Food and Resource Economics Department, University of Florida, Gainesville, FL, 1994.
Study Classification: valuation

Describes and summarizes the results from a statewide survey of 4,206 Florida resident saltwater anglers. The researchers use the contingent valuation method to collect angler responses regarding their willingness to pay for proposed management changes associated with six different marine species. The study showed that recreational anglers did place an economic value on marginal changes in catch regulations. However, the values for specific changes were not well defined and varied considerably across respondents

Milon, J. Walter, Eric M. Thunberg, Charles M. Adams, John C. Crotts, Stephen M. Holland, and C.T. Jordan Lin, *"A Regional Analysis of Current and Future Florida Resident Participation in Marine Recreational Fishing.* Florida." Sea Grant College Program. Report Number 112. Florida Sea Grant College Program, University of Florida, Gainesville, Florida. May 1993.

This report describes and summarizes the results from a statewide survey of Florida residents regarding their participation in marine recreational fishing, their motivations for fishing, and attitudes toward management of Florida?s fisheries. Data from the survey were used to estimate a forecasting model to project recreational fishing in various Florida regions.

Milon, J. Walter, Gary Wilkowske, and George L. Brinkman. "Financial Structure and Performance of Florida's Recreational Marinas and Boatyards." Florida Sea Grant Report No. 53, University of Florida, Gainesville, FL, 1983.
Study Classification: industry analysis

Presents the results of a survey of 283 (71 responses) Florida private and public marinas conducted from June 1981 to March 1982. The data indicated considerable regional diversity among marinas in terms of annual revenues, number of employees, age, size, utilization, and market versus book value.

On a statewide basis, the average age of a private (public) marina was 19 (29) years and, on average, the 1981 owners had owned private (public) marinas for 11 (22) years. Private (public) marinas with 1981 annual revenues under $1 million reported average annual revenues of $444,854 and marinas with 1981 annual revenues over $1 million reported average annual revenues of $2,494,173. Around 33 (14) percent of the private (public) marinas' business was from tourists in 1981. In general, smaller marinas were found to perform at least as well as the larger marinas in terms of liquidity ratios. The median return on investment for all Florida marinas of 10.2 percent was virtually the same as the returns experienced at other Southern and New England marinas, although Florida marinas used less leverage.

Milon, J. Walter, Sherry L. Larkin, Donna J. Lee, Kathryn J. Quigley, and Charles M. Adams. "The Performance of Florida's Spiny Lobster Trap Certificate Program." Florida Sea Grant Report No. 116, University of Florida, Gainesville, FL 1998b.
Study Classification: industry analysis, policy

Assessment and review of Florida's Spiny Lobster Trap Certificate Program (TCP) that included estimates of: administrative costs incurred, revenues collected, and the transfer of certificate ownership and use. Actual costs and revenues were compared to initial estimates to determine whether the TCP has fulfilled expectations about its viability as a regulatory mechanism. Results indicate that the TCP has fulfilled initial expectations by reducing the total number of traps and increasing the yield per trap. The analysis also identified several factors that have inhibited the performance and could potentially jeopardize the overall success of the TCP. Management proposals are discussed that could address these factors.

Milon, J. Walter. "A Nested Demand Shares Model of Artificial Marine Habitat Choice by Sport Anglers." *Marine Resource Economics*. 5(1988b): 191-213.
Study Classification: valuation

Discusses the development and compares alternative specifications of the nested multinomial travel cost demand model used in the study of the economic value of artificial reefs in Dade County, Florida (see Milon 1988a). The modeling approach uses information on the location of fishing sites to construct a decision hierarchy that represents the choices for an individual private boat sport angler deciding whether to use a specific habitat site.

Milon, J. Walter. "Contingent Valuation Experiments for Strategic Behavior." *Journal of Environmental Economics and Management*. 17 (1989b): 293-308.
Study Classification: valuation

Elaborates on the contingent valuation methodology used in the study of the economic value of artificial reefs in Dade County, Florida (see Milon 1988a). The paper summarizes the results of an experiment that tested for the effects of variations in the Dade County mail survey form on respondent's willingness to pay for artificial reef use and their ability and willingness to disclose their personal valuation.

Milon, J. Walter. "Estimating Recreational Angler Participation and Economic Impact in the Gulf of Mexico Mackerel Fishery." Prepared for Southeast Regional Office, National Marine Fisheries Service St. Petersburg, Florida under Contract No. NA86WC-H-06116, RAS/CC31, as part of the Marine Fisheries Initiative. Food and Resource Economics Department, University of Florida, Gainesville, Florida. January 1989a.
Study Classification: valuation, economic impact

Presents the results of the first study to examine the use of the NMFS's Marine Recreational Fisheries Survey (MRFSS) to estimate the economic value of recreational fishing in the Gulf of Mexico. The study concludes that the MRFSS can be used to provide data for the economic evaluation of recreationally caught king mackerel and other species. However, in order to provide reliable economic information, greater consideration in the MRFSS must be given to 1) fishermen's site and species substitution alternatives, 2) fishing activity at different times of the year, and 3) the opportunity cost of time spent in fishing activities.

Milon, J. Walter. "Measuring the Economic Value of Angler's Kept and Released Catches." *North American Journal of Fisheries Management*. 11(1991): 185-189.
Study Classification: valuation

Elaborates on the travel cost methodology used in the study of the economic impact of the Gulf of Mexico king mackerel fishery (see Milon 1989a). The paper focuses on the importance of distinguishing between kept and total (aggregate) catch when assessing angler's valuation of recreational fishing trips. Statistical tests for pooled site travel cost demand models for anglers of king mackerel in the Gulf of Mexico region showed that indicators of kept and released catches outperformed an aggregate indicator. Accounting for the composition of catch had a significant affect on economic measures of the gains and losses from catch regulations and suggested that aggregate indicators may give misleading estimates of the change in economic value due to regulations.

Milon, J. Walter. "The Economic Benefits of Artificial Reefs: An Analysis of the Dade County, Florida Reef System." Florida Sea Grant Report no. 90. University of Florida, Gainesville, 1988a.
Study Classification: valuation

Presents results from a research project to identify recreational uses of artificial reefs by private boat owners in Dade County, Florida and to evaluate merits of alternative methods to measure the economic benefits of artificial reef development. First, the contingent value method was employed (CVM) in three different ways: (l) Open ended/Voluntary, (2) Referendum and (3) Bidding Game. The annual user values for these three methodologies were $18.04, $19.75 and $26.57 per user of artificial reefs. The average user of artificial reefs visited a site about 10 times each 6 month period or about 20 times per year. On a per day basis, this would yield a use value from the three techniques of $.90; $.99 and $1.33 respectively. Various travel cost techniques were used to estimate the use value per year of artificial reefs. The results ranged from $3.14 (nested multinomial Logit) to $20.70 (single site with substitute prices). On a per day basis, this would range from $.16 to $1.04. All values are in 1984 dollars. The capitalized or asset value of the reef system off Dade County was estimated $128.3 million using a discount rate of 3%. This is based on private boat use and does not include party or charter use of artificial reefs.

Milon, J. Walter. "Travel Cost Methods for Estimating the Recreational Use Benefits of Artificial Marine Habitat." *Southern Journal of Agricultural Economics*. July (1988c): 87-101.
Study Classification: valuation

Compares and discusses the single and multi-site travel cost demand models used in the study of the economic value of artificial reefs in Dade County, Florida (see Milon 1988a). Theoretical concerns about price and quality effects of substitute sites, corner solutions in site choice and econometric estimation are considered. Results from the case study indicate that benefit estimates are influenced by the way these concerns are addressed, but relatively simple single site models can provide defensible estimates. Practical limitations on data collection and model estimation are also considered.

Milon, J.W., C.F., and Lee, D.J. *"Conflict and Cooperation on Trans-Boundary Water Resources"'* Ecosystems and Social Conflict: Lessons from the Florida Everglades, Richard Just and Sinaia Netanyahu, eds.; Kluwer Academic Publishers, Boston, MA (1998).

Milon, J.W., Kiker, C.F., and Lee, D.J. *"Ecosystem Management and the Florida Everglades: The Role of Social Scientists."* Journal of Agricultural and Applied Economics Vol. 29(1) (1997): 99-107.

Milon, W.J. and Thunberg, E.M., *"A Regional Analysis of Current and Future Florida Resident Participation in Marine Recreational Fishing. Florida,"* Sea Grant Report No. 112., 1991-1992. 5-1-1993. Gainesville, FL: Florida Sea Grant College Program, University of Florida.

Milon, W.J., Suman, D.O., Shivlani, M., and K.A. Cochran, *"Commercial Fishers' Perceptions*

of Marine Reserves for the Florida Keys national Marine Sanctuary." Florida Sea Grant Report TP-89., 1995-1996. 12-1-1997. Gainesville, FL: Florida Sea Grant College Program, University of Florida.

Mulkey, David, Stephen Gran, and Charles A. Adams, *"Monroe County: An Economic Overview."* Final Report of a Component Study (Volume II) for the Economic Adjustment Assistance Development Grant for Monroe County, Florida. Food and Resource Economics Department, University of Florida , Gainesville, Florida. June 1, 1994.

Available secondary data were compiled and assimilated to describe a variety of economic and social characteristics of Monroe County. Data were obtained from a number of sources, both from county and state agencies. Data are related to population, income, employment, unemployment, retail sales, tourism development tax proceeds, and commercial and recreational fishing activities. Data are presented for major economic sectors of the local economy, and more detailed data are presented for the service and retail sales sectors due to their relative importance.

Parker, Suzanne L., *"Report on a Survey of Floridians' Attitudes about Environmental Issues,"* for Florida Department of Environmental Regulation (Now Department of Environmental Protection). Tallahassee, Florida. November 1989.

This study involved a phone survey of approximately 1,000 residents of the State of Florida regarding their attitude toward various environmental issues facing the state. First, among all other issues (e.g., unemployment, taxes, etc.,) the environment ranked first in the public's mind. Most individuals in the survey characterized themselves as environmentalists. Main concerns were air and water quality and the protection of endangered species. Most individuals would be willing to pay more for environmental control

Platt, Johnathan L., *Estimating the Economic Impacts of Hypothetical Grouper Bag Limits in the Destin/Panama City, Florida Charterboat Fishery,* NOAA Technical Memorandum NMFS-SEFC-227, 1989, 1-72.

The purpose of this study is to estimate the use value of recreational grouper fishing by anglers using charter boats off the Destin/Panama City, Florida area. The policy purpose is to find out how use value varies with bag limits, a fishery management regulatory tool. A sample of 434 charter boat anglers was collected in 1985. The travel cost technique was applied to this sample to determine use value/consumer surplus. Analytical results indicated a median of 1.69 trips and $78 per angler per year without bag regulations. Closure of the grouper fishery (i.e., catch and release) would reduce demand to 1.55 trips and $66 annually. The value of time was integrated into all use value estimates. Anglers included Florida resident and those from out-of-state.

Robinson, Steven D., *"Tortious Water and Land Use in the Big Cypress Swamp."* University of Miami Law Review . Vol. 25, No. 4. Miami, Florida. April 1971.

This article reviews scientific and policy literature related to the Big Cypress Swamp, and reviews

Florida law decisions and the relationship between them. This article attempts to tie solutions to environmental problems to an existing common law system as in the case of Florida water law and the crisis in the Big Cypress Swamp. Until now economic consideration, such as profitable use of private property, expansion of the economic base, increased production, and meeting the housing needs of a growing population, have been salient. Modern water law permits us to make value judgements to resolve these competing factors. These judgements must necessarily stress factors which are environmental."

Rockland, D.B., *"The Economic Impact of the Sport and Commercial Fisheries of the Florida Keys,"* 1986. 1-1-1988. Washington, DC: Sports Fishing Institute.

The purposes of this study were to estimate the economic impact of the sport and commercial fisheries in the Florida Keys on the economy of Monroe County, Florida and the State of Florida. Economic impact is defined in terms of sales/output, income, employment, and tax revenues generated by spending associated with each of the fisheries. A main objective was to provide comparable information for both the sport and commercial fisheries so valid comparisons could be made between each of these user groups.

Ross, D.M. *"Report on Everglades National Park Visitor Survey,"* 10-1-1985. Everglades National Park, Air Resource Specialists, Inc., Miami, Florida.

The purpose of the visitor's survey was to collect information to determine how important visibility-related attributes are to other attributes found in Everglades National Park. Such information was obtained from randomly selected visitors from the park's Visitor's Center who completed and mailed back their surveys. Results of the surveys have provided park management with a typical visitor profile, the most popular park locations, and the most important attributes of the recreational experience.

Sharp, W.C., Bertelsen, R.D., and Hunt, J.H. *"The 1994 Florida Recreational Spiny Lobster Fishing Season: Results of a Mail Survey."* Gulf and Caribbean Fisheries Institute Volume 48 (1998): pp. 29.

Since 1991, the Florida Department of Environmental Protection has conducted annual mail surveys of recreational spiny lobster fishers in Florida. These surveys concern lobster fishing activity during the periods of the Special Two-Day Sport Season and the first month of the regular season and allow us to estimate the recreational harvest, the number of people that fished, fishing group size, and the catch per unit effort (CPUE) for those times. An estimated 362,369 lobsters were harvested by 51,510 fishers during the 1994 Special Two-Day Sport Season and about 1,320,045 lobsters were harvested by 63,225 fishers during the first month of the 1994 regular season. Most (64%) of the total number of lobsters captured during these two survey periods were harvested in the Florida Keys, and those fishing in the Florida Keys had the highest mean CPUE.

Snell, R. and Boggess, W. *"Everglades Case Study: Water, Agricultural and Environmental Policy Issues."* 7-1-1994. Congressional Office of Technology Assessment. Washington, D.C.

Stewart, W.P. and Ivy, M.I. *"A Sociology Study of Wintertime Backcountry Users at Everglades National Park."* (Technical Report No. 14). 2-1-1990. National Park Service Cooperative Park Studies Unit. Texas A&M University. College Station, Texas.

The study of winter season backcountry users at Everglades National Park was used to build a sociological database that could also be used as a basis for effective management decisions. Recommendations made by the study emerged from an on-site and mail-out survey of day and overnight users; the effectiveness of policies at analogue park areas; the collective professional judgment of scholars and land managers associated with outdoor recreation; and the author's past experience and opinions. Among such recommendations are: (l) enhance and expand the density of recreational experience afforded by the park's backcountry; (2) expand the number of designated sites within close proximity to trailheads; and (3) maintain and improve backcountry trip planning facilities.

Stratis, Nick and Bendle, Bradley. "A Socio-economic Study of the Rodman Reservoir." Florida Department of Environmental Protection, Economic Analysis Section, Office of General Counsel: Tallahassee, FL. 1995.

This report was developed to address the economics of restoring the Oklawaha River. Four options were assessed: 1) Full retention of the Rodman Reservoir (status quo), 2) Partial Retention (smaller reservoir), 3) Partial Restoration (removal of the Rodman Dam), and Full Restoration (restoration of the Oklawaha River as close as possible to its pre-impoundment condition. Non-market recreation user values were estimated for both the Rodman Reservoir and the Oklawaha River using the travel cost method. The study estimated the consumer's surplus per person per day of $12.17 for the Rodman Reservoir for all visitors and $10.09 for those living within a 75-mile radius. For the Oklawaha River the study estimated a consumer's surplus per person per day of $8.18 for all visitors and $6.78 for those living within a 75-mile radius of the site. Estimates were in 1994 dollars.

Stronge, William B. and Schultz, Ronald R., "Broward County Beaches: An Economic Study 1995-96." Technical report 97-03. Prepared for the Broward County, Department of Natural Resource Protection, Biological Resources Division: Ft. Lauderdale, Florida by Regional Research Associates, Inc., Boca Raton, FL. 1997.

This report developed estimates of both the market and non-market economic values of Broward County beaches for year 1995-96. Market economic values estimated included direct expenditures, indirect expenditures, tax revenues, and the number of jobs in Broward County, Southeast Florida and all of Florida. In addition, property values related to proximity to the beaches are also estimated. Non-market economic use values are estimated using a contingent valuation question. Overall the study estimated that there were 7,169,447 visits to Broward County beaches that generated a total annual non-market economic user value of $29,677,770. Per visit values, in 1998 dollars, were reported for Delray Beach ($4.94), Anna Marie Island ($41.2) and Captiva Island ($7.00).

Suman, D.O. and Shivlani, M.P., *"Commercial Fishermen and the Florida Keys National Marine*

Sanctuary." The Coastal Society, First Conference Proceedings. January 1996.

The paper discusses the perceptions of commercial fishermen regarding the Florida Keys National Marine Sanctuary and its proposed zoning strategy, based on a survey study conducted with 340 fishermen in the Florida Keys. The study determined that 79 percent of the respondents are against the establishment of the Sanctuary, and 87 percent disapprove of the Sanctuary zoning strategy. Only six percent believe that their group will be the primary beneficiary of the zoning plan, and more fishermen perceive that the purpose of the zones is to protect and conserve biodiversity than to augment stocks either within or outside the zones. A majority of the respondents disapprove of the Sanctuary planning process, and almost two-thirds of the fishermen believe that participation in the process is futile because of their inability to influence the decisions.

Suman, Daniel O. and Manoj P. Shivlani, **?***Catch and Effort Profiles of Commercial Fishermen in the Florida Keys National Marine Sanctuary."* Draft report. Division of Marine Affairs and Policy, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, Florida. October 1997.

The draft article presented catch and effort profiles for the major fisheries in the Florida Keys, as reported by 340 commercial fishermen during a 1995-96 study. The article demonstrated the importance of the Florida Keys National Marine Sanctuary region to the major commercial fisheries, where over 90 percent of the spiny lobster and reef finfish, and two-thirds of the stone crab catch were landed in 1994-95. The article also demonstrated the geographical importance of certain species, such as migratory mackerels and deep-water pelagics. The article also gave effort information by fishery.

Suman, Daniel O. and Manoj P. Shivlani, "*Data and Results from Dive Operator Surveys in the Florida Keys: Use and Perceptions of the Florida Keys National Marine Sanctuary."* Draft report, Division of Marine Affairs and Policy, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, Florida. October 1997.

The draft report summarizes the results of a study conducted with dive operators in the Florida Keys in 1995-96. The study surveyed dive operators in the region, and provided estimates of the economic investments and annual operating costs of dive operators, the total number of divers taken by the operators on an annual basis, and the intensity of site use and trip frequency within Florida Keys National Marine Sanctuary proposed zones. The study also reports the perceptions of dive operators regarding the Sanctuary planning process and zoning strategy. Dive operators were generally in favor of zones in the Florida Keys but disapprove of the Sanctuary zoning strategy. Most respondents believed that diving and snorkeling activities do affect marine resources and that mooring buoys had a positive effect on the environment. However, a majority of the dive operators were unwilling to support either a dive operator-funded or diver-funded mooring buoy program in the Sanctuary.

Suman, Daniel O. and Manoj P. Shivlani, "*Preliminary Results from Mail Survey by means of Three Florida Keys-based Environmental Groups and their Perceptions on the Florida Keys National Marine Sanctuary Zoning and Designation Process."* Division of Marine Affairs and

Policy, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, Florida. October 1997.

The study was conducted using mail surveys between late 1995 and early 1996. The study describes and analyzes the use preferences and perceptions of members from three Florida Keys-based environmental groups regarding the Florida Keys National Marine Sanctuary (FKNMS). Environmental group members were generally in favor of the FKNMS, but their levels of support were much lower towards the Sanctuary's zoning strategy. The respondents perceived the zoning strategy more as a means of conserving and protecting bio-diversity, rather than for maintaining fish stocks within the region. A majority of the members are in favor of increasing the percentage of zones in the FKNMS and are willing to contribute towards zone management via user fees.

Thunberg, Eric M., Charles M. Adams and Charles E. Cichra, "E*conomic Regulatory and Technological Barriers to Entry Into the Florida Aquaculture Industry."* Sea Grant College Program, University of Florida, Gainesville, Florida. Florida Sea Grant Report E1 91-8. December 1, 1991.

A mail survey was conducted in 1991 to identify barriers-to-entry into the Florida Aquaculture industry. The survey was administered to all 586 individuals on the Florida Agricultural Statistics Service Aquaculture industry participant list. The survey results showed that economic factors (financial and marketing) presented the greatest barriers-to-entry into the Florida Aquaculture industry, while regulatory barriers were relatively less problematic. Barriers were found to be highest for catfish culturists, followed by ornamental fish, bivalves, aquatic plants, and alligators.

Tilmant, J.T. *"A History and an Overview of Recent Trends in the Fisheries of Florida Bay."* Bulletin of Marine Science Volume 44(1) (1989): 3-22.

This paper presents a historical review and description of the fisheries of the Florida Bay. Documented interest in the fishery resources of Florida Bay dates from the earliest accounts of human activity. and harvest of both commercial and recreational fisheries up to the present time. The total recreational fish harvest from Florida Bay by guided and non-guided parties has ranged between 700,000 and 800,000 fish per year since 1984. The National Park Service (NPS) monitoring program has provided detailed data on the fishing effort.

Tilmant, J.T., Rutherford, E.S., Dawson, R., and Thue, E.B. *"An Analysis of the Recreational and Commercial Estuarine Fisheries Harvest within Everglades National Park 1958-1985,"* Report SFRC 86/08. 1-1-1986. Homestead, Florida, Everglades National Park.

This study examines and reports on both recreational and commercial fisheries data in the estuarine areas of Everglades National Park from 1958-1985 as well as stock assessments that were conducted on major species harvested. 1965 permitting and voluntary reporting of catch of commercial fishery harvest provided data for the report in addition to boat ramp interviews with fishermen for recreational harvest data.

Tilmant, J.T., Schmahl, G.P., and Morrison, D. *"An Ecological Assessment of Biscayne National Monument's Coral Reefs in Relation to Recreational Use."* Homestead, Florida, U.S. Department of the Interior, National Park Service, Everglades National Park. 1980.

The emphasis of this coral reef study, initiated in 1977, was to provide basic ecological data and determine possible impacts of recreational reef use. Environmental conditions of 4 buoyed patch reefs were compared to four similar unmarked control reefs. On each study reef, periodic observations were made of fish populations, coral communities, etc., and levels and types of visitor activities. Significant ecological impact from recreational use was evident.

U.S. Army Corps of Engineers. *"Florida Keys Carrying Capacity Study: Final Scope of Work."* 10-1-1997. Jacksonville District, Florida Department of Community Affairs.

U.S. Department of the Interior, *"E.N.P. An Assessment of Recreational Boating and Its Potential Impact on Resources within the Crocodile Sanctuary at Everglades National Park,"* 1-1-1991. Washington, D.C.

This study reevaluated the concept of the Florida Bay Crocodile Sanctuary for the purposes of incorporating and allowing recreational boaters into the sanctuary while minimizing known and possible adverse efforts upon the endangered American crocodile. Methods used in this study include a literature search and consultations with park staff and various agency and university specialists. The study determined that providing certain limited and seasonal recreational access to the sanctuary would not adversely impact either the threatened or endangered species in the area.

United States Department of the Interior, "*The Impact of Federal Programs on Wetlands: A Report to Congress by the Secretary of the Interior,"* United States Department of the Interior. Vol. II, Chapter 7. Washington, D.C. March 1994.

Chapter 7 of the Secretary of the Interior's Report gives a physical description of the past and current extent of the Everglades ecosystem. Some recommendations and potential solutions that were elicited may alter the Federal government's role in the Everglades Ecosystem. Where feasible, agencies should minimize the wetland effects of their programs. Where this proves infeasible, agencies should furnish Congress with an explanation of why adjustments cannot be instituted.

United States General Accounting Office (USGAO), "*Restoring the Everglades: Public Participation in Federal Efforts."* Resources Community, Economic Development Division. USGAO, Washington, D.C. October 1995. RCED-96-5

This document reviews the implications of involving non-federal entities (stakeholders) in the policy development process for specific environmental concerns in South Florida. Constraints imposed by external factors often dictate the extent to which federal agencies can involve nonfederal stakeholders in their activities. Furthermore, although consensus among federal and nonfederal stakeholders is desirable, restoration efforts are inherently contentious, and consensus on solutions that directly affect various interests may not be attainable. In addition, stakeholders express dissatisfaction with

the process for nonfederal involvement. In many cases, a public policy decision cannot be disassociated from stakeholder dissatisfaction with the outcome of the process. Therefore, the most that federal agencies may be able to achieve is an open airing and full consideration of all views within the constraints imposed by external factors.

Vrana, K.J. and Mahoney, E.M. *"Impacts on Underwater Cultural Resources: Diagnosing Change and Prescribing Solutions."* Underwater Archaeology 1995 (annual proceedings)176-180.

The paper identifies and discusses impact assessment concepts from different management and research fields, as applied to underwater cultural resources (in particular, shipwrecks). Concepts discussed include (a) shipwrecks as exhaustible, nonmarket resources; (b) impacts and effects upon these sites; (c) classification of impacts; (d) carrying capacity concepts; and (e) impact decision – making frameworks (e.g., recreation Opportunity Spectrum; Visitor Management Process, Limits of Acceptable Change, Visitor Impact Management). The review of literature provides some conclusions about impact assessment for shipwrecks, and shipwreck management in general.

Ward, J.M, *"The Economic Implications of Bycatch and Discards in the Gulf of Mexico Shrimp Fishery."* 9-1-1992. St. Petersburg, FL: National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Center. Also, see "*The Bioeconomic Implications of A Bycatch Reduction Devise as a Stock Conservation Management Measure*" Marine Resource Economics, Vol. 9, pp. 227-240, 1994.

The proposed regulations to reduce bycatch and discarding of finfish in the Southeastern region of the United States is a gear modification that excludes finfish from shrimp trawls. This regulation was analyzed using a simple theoretical model of a multi-species fishery whose bycatch was harvested in a direct fishery consisting of commercial and recreational fishermen. The "no-cost" reduction in bycatch fishing mortality imposed on the multi-species fishery does not result in an increased stock size for the bycatch fish species or a substantial increase in its level of harvest. Instead, the fish stock is reallocated from the multi-species fishery to the fishery directed at the bycatch species causing fishing effort to expand in the bycatch species fishery that drives the stock size down to the previous existing equilibrium level. Recreational harvest and effort levels remain unchanged since the model is linear in effort and the commercial fishery is given access to the fishery first.

Wiedman, D. "*The Individual and Innovation in the Process of Socio-cultural Adaptation to Frontier Situations."* Papers in Anthropology University of Oklahoma, Norman, OK. Volume 17, No. 1 (1976): 107-116.

This paper outlines a process of human adaptation to new environments. Ethnographic fieldwork and historical data from the Chokoloskee Bay area of Southwest Florida are used in a comparative analysis of three frontier areas of the World. This process is suitable for understanding the various cultural groups as they adapt to South Florida environments. For example, their settlement patterns, use of resources and technological innovation.

York, M. and O'Brien, J. "*Eastward Ho! Financial Impediments and Solutions*," Florida

Department of Community Affairs (DCA), FAU/FIU Joint Center for Environmental and Urban Problems, Tallahassee, Fl., l996.

This project examines the financial impediments that deter development and redevelopment in the established urban corridor areas in South Florida. It seeks to offer solutions to these problems in order to strengthen these urban communities while lessening some of the development pressure in the less developed western portions of the three South Florida counties.

Zubrow, Ezra B.W., James R. Schumm, Symma Finn, Gail A Panetski and Justin Van Ness. "*The Biological Reserve: The Future's Last Stand.*" Futures, Cedar Falls, Iowa. Vol. 27(4). pp. 437-446. April 1995.

This article addresses the societal and cultural aspects of bio-reserves and environmental restoration programs. It begins with a discussion of bioreserves, then uses the example of a Man and Biosphere (MAB) inspired study of the US Everglades to illustrate how land has been shaped historically by culture and technology. It then demonstrates how current conflicts of values and culture, from both inside and outside the region, and from interest groups with both pragmatic and emotional attitudes, are determining the future of an environment such as the Everglades. The article thereby shows how human values and perceptions impact on the development of a sustainable Everglades, using the findings of surveys and public meetings to highlight the interests of the competing communities, ethnic and interest groups involved.